Marketing Series No. 66

AMA. 25 II
1,500

AGRICULTURAL MARKETING IN INDIA

Preliminary guide to Indian fish, fisheries, methods of fishing and curing.

Revised Edition

PUBLISHED BY THE MANAGER OF PUBLICATIONS DELHI.
PRINTED IN INDIA BY THE MANAGER GOVERNMENT OF INDIA PRESS SIMLA
1951.

Price 6sh. 9d

List of Publications issued by the Agricultural Marketing Adviser to the Government of India.

Symbol No.	Name of Publication.	Price.
*AMA. 1	Report on the Marketing of **Wheat** in India	Rs. 1-4-0 or 2s.
*AMA. 2	Report on the **Cold Storage** and Transport of Perishable Produce in Delhi	As. 12 or 1s. 3d.
AMA. 4	Abridged edition (in English) of the Report on the Marketing of **Wheat** in India	As. 8 or 10d.
AMA. 5	Abridged edition (in Hindi) of the Report on the Marketing of **Wheat** in India	As. 8 or 10d.
AMA. 6	Abridged edition (in Urdu) of the Report on the Marketing of **Wheat** in India	As. 8 or 10d.
*AMA. 7.37	Annual Report of the Agricultural Marketing Adviser and summarised reports of Senior Marketing Officers in Provinces and certain States for the year ending 31st December, 1937	As. 6 or 8d.
*AMA. 7.38	Annual Report of the Agricultural Marketing Adviser and summarised reports of Senior Marketing Officers in Provinces and certain States for the year ending 31st December, 1938	As. 12 or 1s.
*AMA. 7.39	Annual Report of the Agricultural Marketing Adviser and summarised reports of Senior Marketing Officers in Provinces and certain States for the year ending 31st December, 1939	Rs. 1-10-0 or 2s. 6d.
*AMA. 7.40	Annual Report of the Agricultural Marketing Adviser and summarised reports of Senior Marketing Officers in Provinces and certain States for the year ending 31st December, 1940	Rs. 1-4-0 or 2s.
*AMA. 8	Report on the Marketing of **Linseed** in India	Rs. 1-4-0 or 2s.
*AMA. 9	Report on the Marketing of **Eggs** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 10	Report on the Marketing of **Tobacco** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 11	Report on the Marketing of **Grapes** in India and Burma	Rs. 1-4-0 or 2s.
AMA. 12	Abridged edition (in English) of the Report on the Marketing of **Linseed** in India	As. 8 or 9d.
AMA. 13	Abridged edition (in Bengali) of the Report on the Marketing of **Linseed** in India	As. 8 or 9d.
AMA. 14	Abridged edition (in Hindi) of the Report on the Marketing of **Linseed** in India	As. 8 or 9d.
AMA. 15	Abridged edition (in Marathi) of the Report on the Marketing of **Linseed** in India	As. 8 or 9d.
AMA. 16	Abridged edition (in Urdu) of the Report on the Marketing of **Linseed** in India	As. 8 or 9d.
*AMA. 18	Report on the Marketing of **Coffee** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 19	Abridged edition (in English) of the Report on the Marketing of **Eggs** in India and Burma	As. 8 or 9d.
*AMA. 20	Report on the Marketing of **Rice** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 21	Report on the Marketing of **Potatoes** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 22	Report on the Marketing of **Milk** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 22.2	Do. (2nd Edition)	Rs. 1-4-0 or 2s.
*AMA. 23	Report on the Marketing of **Sugar** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 24	Report on the Maketing of **Groundnuts** in India and Burma	Rs. 1-4-0 or 2s.
*AMA. 25	Preliminary guide to Indian fish, fisheries, methods of fishing and curing	Re. 1 or 1s. 6d.
*AMA. 26	Abridged edition (in Hindi) of the Report on the Marketing of **Eggs** in India and Burma	As. 8 or 9d.
*AMA. 27	Abridged edition (in Urdu) of the Report on the Marketing of **Eggs** in India and Burma	As. 8 or 9d.
*AMA. 28	Abridged edition (in English) of the Report on the Marketing of **Potatoes** in India and Burma	As. 8 or 9d.
*AMA. 29	Abridged edition (in English) of the Report on the Marketing of **Grapes** in India and Burma	As. 8 or 9d.
*AMA. 31	Abridged edition (in English) of the Report on the Marketing of **Groundnuts** in India and Burma	As. 8 or 9d.
*AMA. 30	Abridged edition (in English) of the Report on the Marketing of **Milk** in India and Burma	As. 8 or 9d.

*The Report is out of stock.

TABLE OF CONTENTS

PREFACE TO THE SECOND EDITION

The " Fish Guide " was released to the public in 1940 and a complementary volume the " Report on the Marketing of Fish in India, " in June, 1946. Both the publications have been sold out. Meantime conditions have changed since after partitioning of the country in 1947. There is great demand for copies of these publications and it was, therefore, decided to revise the publications in the light of the changed conditions. Opportunity has been utilised to touch up the descriptive characteristics of fishes and to enlarge the scope of the " Guide " by including a section on fishing boats.

Any suggestion for improving the scope and utility of the " Guide " would be welcome and would receive careful consideration.

The Government of India should not be regarded as assuming responsibility for any statements contained in the " Guide ".

DIRECTORATE OF MARKETING & INSPECTION,
MINISTRY OF AGRICULTURE
GOVERNMENT OF INDIA
NEW DELHI.
March 1949.

FOREWORD TO FIRST EDITION.

The maritime and riverine fisheries of India now occupy but a minor place in the economic organisation of the country. The Royal Commission on Agriculture noted the failure to develop the fisheries of the country as a source of food and pointed out that fish forms a specially valuable addition to a diet the staple of which is rice. Generally only the coastal waters from five to seven miles from the shore are at present exploited. The fishing implements used still remain what they were nearly a century ago *viz.*, the small country boats and the hand-operated nets. Power-fishing and bottom-trawling have never been seriously attempted. This it would seem is partly due to a belief that it is not possible to increase the catch without considerable dislocation of the existing marketing arrangements. At the same time, however, even a preliminary survey shows that the markets everywhere are under-supplied.

Most varieties of fish caught along the coasts are edible. But people in the urban areas, including those in the coastal towns, do not buy any fish beyond certain types to which they have become accustomed. These varieties are caught only in limited quantities. The main varieties, which constitute the bulk of the catch are unfortunately not commonly used by the urban consumers, although they are equally nutritious and good.

This may be partially ascribed to ignorance on the part of the distributive trade and the buying public. This will no doubt be dispelled as a result of the marketing survey which is at present being carried out but even in the early stages of the survey it became evident that the multitude of vernacular names current in the different parts of the country is so confusing that something in the nature of a dictionary is necessary so that marketing investigators and others may clearly comprehend one another.

The " Preliminary guide to Indian fish, fisheries, methods of fishing and curing " has therefore been compiled with this object in view. The aim has not been to make the guide a scientific compilation and hence, all the detailed characteristics which define a particular fish are not given in the description. But the information on distinctive markings, peculiarities of shape, colouration, etc., as given should, it is considered, provide sufficient data for any layman to recognise the different varieties of fish. Although the guide was primarily intended for departmental use, it will probably appeal to fishermen—both amateur and professional—as well as to traders, students and others and has, therefore, been issued as a priced publication.

For the preparation of this guide many specimens have been examined and a number of publications and papers dealing with Indian fishes have been consulted. The description and nomenclature of fish are based mainly on Day's two volumes on "Fishes" in the *Fauna* of *British India* series. Thanks and acknowledgments are due to the authorities of the Bombay Natural History Society for permission to reproduce in this guide several sketches of fish which have appeared in the Society's Journal and to the Zoological Survey of India for kind co-operation in compilation.

January, 1941.

A.—FISHES.

(1) General description.

Fishes are divided into various Orders, Families, Genera and Species, the classification being based on resemblances or differences in structure and anatomy. " Order " signifies fundamental differences apparent even at a casual examination. The " Family " is a group of fishes within an " Order ", which exhibits certain general characters in common. From general resemblances one next proceeds to particular affinities. To specify these affinities, " Genus " or Genera are established where the different members of the family are arranged in accordance with these affinities. Finally, one finds that members of a gents may themselves be distinguished from one another by specific and subtle structural modifications. Thus one comes ultimately to the " Species ".

In scientific nomenclature a compound name consisting of two words is ascribed to a fish. The first word represents the genus and the second the species. For practical purposes, such as marketing investigations, however, it would not be necessary to carry the identification of a fish beyond the genus, *i.e.*, identification of the species may not be required The differences between the various species of a genus may be only differences indicated in the structure of the teeth, the position of the fins or the number and arrangement of scales. However, all characters of a fish vary so much that one fish cannot be taken to represent the species even for certain purposes.

The main external characters of fishes and the common terms used in the description (*see* also plates 1 and 2) are explained below :

(2) Form of body.

Generally the body of a fish is boat shaped with a slightly flattened ventral (bottom) surface and a somewhat sharp-edged dorsal surface. The fishes are longer than they are broad or deep. But many variations from the typical form are found. The body of a fish is described as compressed when it is flattened from the sides (*c.f.* carps). It is said to be depressed when it is flattened vertically (*i.e.* from above) as with some of the cat-fishes. There are also the extreme cases of (*a*) the eels which have an elongated cylindrical body, (*b*) the ribbon-fishes with a compressed band-like form, (*c*) the flattened bodies of skates and rays which live or move about the bottom of the ocean and (*d*) the laterally compressed bodies of the flat-fishes which always swim or rest on the right or left side.

(3) The head.

The head of a fish is the wedge which cleaves the water. The pressure of the surrounding water leaves its mark on this organ which gets moulded according to the speed of the movement. The portion of the head in front of the eye is called the Snout.

The nostrils usually lie above the snout and they are two openings, one on each side.

(4) The mouth.

The mouth shows variations dependent on the nature of the food of the fish and the method of obtaining it. It may be narrow or pointed or may be just an extremely wide cleft. It may be pointed upwards or downwards. If it is in front of the snout it is described as *anterior*, if on the upper surface of the head *superior*, if the position of the mouth is on the lower surface it is termed the *inferior*, but when it extends on each side the position is termed *lateral*. Round the mouth there may be tubular prolongations of skin (called barbels) which are the organs of touch. The barbels are otherwise known as " feelers " as with their aid a fish can feel for its food without seeing it. The barbels are named after the part from which they spring :— *Nasal* from the region of the nostrils, *Rostral* from the snout, *Maxillary* from the upper jaw and *Mandibular*, from the lower jaw.

(5) The eyes.

The eyes of fishes are usually large. The size and position of the eyes vary in different groups of fishes. Usually the eyes are situated on the sides of the head. In many soles they lie close together one one side, while in some of the mullets (*Mugil* species) and other fishes they lie on the top of the head and are directed upward. Fishes do not possess eye-lids ; but in some groups folds of skin—circular or lateral—are developed which partially or completely cover the eyes. These skin-coverings are called adipose eye-lids.

(6) Fins.

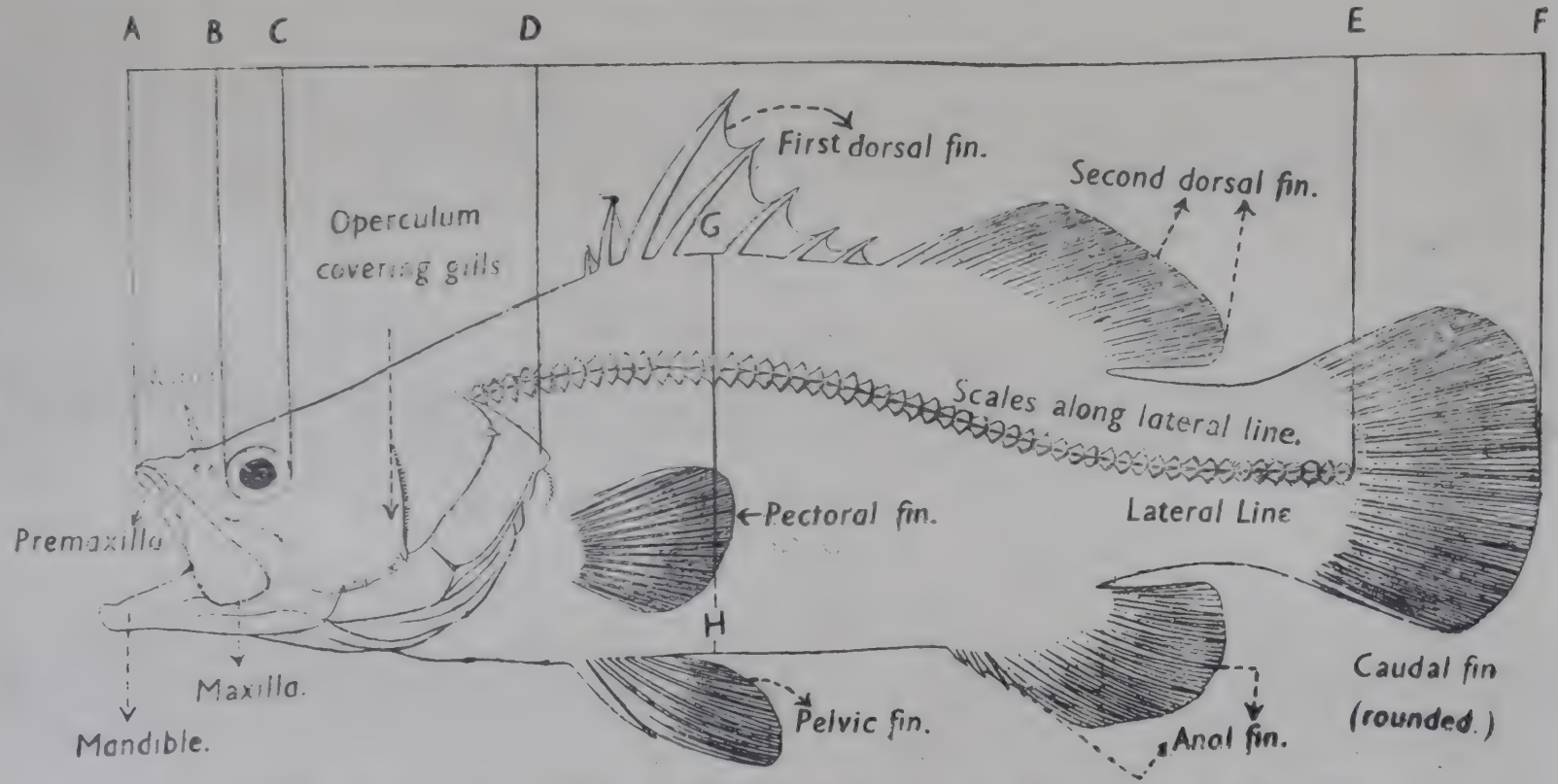
The fins of fishes are of two types : paired fins and vertical fins. The paired fins consist of one pair in the fore-part of the body called the pectorals and another pair lower below on the lower surface of the body called the ventrals. The paired fins are not of any great use for movement but they help the fish to maintain balance. Either or both these pairs may be absent in fishes. The vertical fins are the dorsal, the caudal and the anal. The fin on the middle line of the back is called the dorsal. In some groups of fishes there may be two distinct dorsal fins either touching each other or separated by a small or considerable space. Sometimes the second dorsal fin consists merely of an adipose growth of skin and has no supporting rays. It is then called an adipose dorsal fin.

The tail fin is called the caudal and the vertical fin in the middle line of the belly the anal fin.

The bony structure which supports the fins may be either simple or branched. When the bony filaments are composed of numerous branched joints they make the fin flexible. In such cases the rays- the structural bony elements—are said to be articulated and the jointed fin rays are described as soft rays. When the ray is neither jointed nor branched, it is described as a spine. The lack of joints is what distinguishes a spine from a ray as some spines may be quite soft and flexible.

The caudal fin is of various shapes. It may be deeply forked, slightly forked, truncate, rounded, lanceolate or ovate.

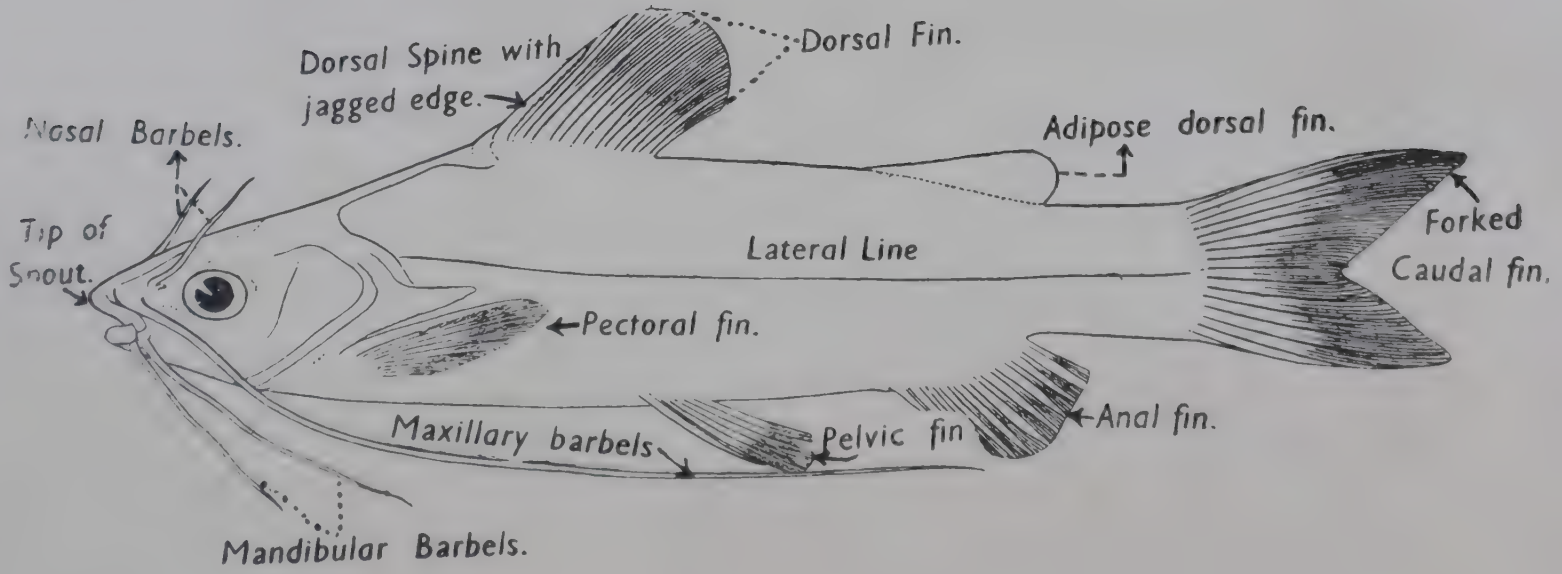
LATERAL VIEW OF "BECKTI" (*Lates calcarifer*) LABELLED TO SHOW THE VARIOUS PARTS.



AB = Length of snout ; AD = Length of head ; AE = length of body ; AF = Total length

BC – Diameter of eye ; GH = Depth of body.

LATERAL VIEW OF A COMMON CAT-FISH TO SHOW CERTAIN STRUCTURES NOT PRESENT IN "BECKTI".



(7) Scales.

Scales of bony fishes are described as *cycloid* when their free upper margin is evenly curved or smooth and *ctenoid* when the upper margin of each scale is rugged and presents a broken and serrated appearance (*see* plate 3 . True scales are absent in *Elasmobranchs*, but are represented by the ossified papillae of the skin. These, as well as the ossified scutes occurring in Rays are called *placoid* scales.

(8) Lateral line.

In most bony fishes there is a line of perforated scales running along each flank, which is called the lateral line. There is a group of sensory cells beneath each pore which serves to give the fish impressions of slight pressure changes in the current of water. The number of rows of scales between the lateral line and other points of the body of the fish is important for identifying the species.

(9) Gills.

Below the mouth and at the side of the fishes head there is a large movable gill cover. This flap like fold of skin is supported by a number of bones moved by muscles which cause the gill to open and shut. The supporting bones are called the opercles. The water which has entered through the mouth, traversed the gillclefts and bathed the gills is extruded through the gill openings.

Certain fresh-water fishes possess accessory respiratory devices for direct aerial respiration. Such fishes, continue to live for some time, when taken out of water, if kept moist [*see* pp 47 to 50 ; plate 42 (a)].

(10) Measurements.

The actual length of a fish does not have much significance as fishes grow as long as they live. But the relative lengths of the different parts of the body remain constant. The length of the fish is measured from the tip of the snout to the base of the tail fin. The length of the head etc., is compared to the length of the body. In determining the relative proportions, the measurements of fairly adult specimens are taken.

Length of body.—It is measured from the tip of the snout to the origin of the caudal fin.

Total length.— It is measured from the tip of the snout to the end of the tail fin.

Depth.—It is the vertical distance between the dorsal and ventral surfaces at the deepest part.

Length of the head.—It is the length fr om the tip of the snout to the hind margin of the bony portion of the gill cover. Width of the head is taken at the widest part.

(11) Relation between weight and linear measurements.

As it is not always possible to weigh a fish, the following formula (after Major W. B. Trevenen*) for computing the weight from linear measurement may be useful :—

$$\text{Weight in pounds} = \frac{(L+0\cdot25\ L) \times (G)^2}{1{,}000}$$

Where L = the length from the closed mouth to the forked tail in inches and,

G = the greatest girth in inches.

B.—PRINCIPAL GROUPS OF FISHES AND THEIR DISTRIBUTION UNDER EACH GROUP.

(1) Elasmobranchs Group.

This group includes sharks, saw fishes, skates and rays.

The fish are employed as food ; and products like gelatine and glue are obtained from the fins. The fins (excepting the caudal) are cut at the roots so as to exclude flesh, treated with slaked lime and sun-dried. The dried product is exported largely to China.

General characteristics.

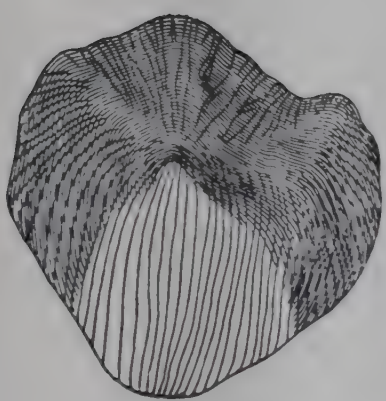
The skeleton is composed of soft cartilage instead of hard bones. The skin is covered with placoid scales, (or shagreen), or with bony bucklers, or else it may be naked. The species are never endowed with embedded scales. The structure of the tail is peculiar. The upper lobe of the Caudal fin is produced, and in the rays the tail is in the form of a long whip-like structure. The gills are attached by their outer edges to the skin with a gill-opening intervening between each two laminae. There is no gill cover. The eggs are large and hatched within the body or deposited in a leathery case.

Species of Commercial Importance.

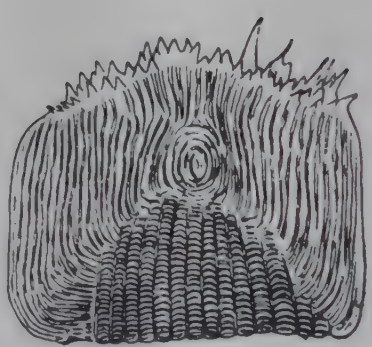
(*a*) Sharks	.. ..	(*i*) Carcharias gangeticus. (*ii*) Galeocerdo rayneri. (*iii*) Zygaena blochii.
(*b*) Saw fish	.. ..	Pristis cuspidatus.
(*c*) Skate	.. ..	Rhynchobatus djeddensis.
(*d*) Ray	.. ..	Trygon sephen.

*Journ. Bom. Nat. Hist. Soc., Vol. XXXV, 1932, P. 44.

Types of Scales.



Cycloid Scale



Ctenoid Scale

THE "GROUNK-SHARK OF THE RIVERS".

Carcharies gangeticus

(Length up to 7 feet)

From a photograph of a model in the Indian Museum, Calcutta.

(*a*) Sharks.

The sharks are found throughout the seas, but are most numerous in the tropical regions. Many ascend rivers even far beyond the influence of tides. They are not known to descend to great depths, *i.e.*, they are more or less pelagic. The sharks are able to detect blood and offal from long distances.

The body of a shark is more or less cylindrical with the trunk imperceptibly merging with the tail. It is the teeth rather than the size, which determine the true character of these animals : " Some powerful forms have small teeth, while the obtuse teeth of particular genera are more calculated for crushing shells and crustances than for waging war with other fishes " (Day). The tail is flexible and ends much like the blade of an oar giving the shark great power of pursuit. The mouth is ventral and when seizing the prey the shark generally turns on one side.

Small sharks ar eeaten by the poorer people. The fins of sharks are treated with lime and sun-dried. Gelatine is prepared from them, while the better sorts of fins are used for culinary purposes. The shark-livers are boiled down for the oil which they contain. The liver-oils have been found to be very rich in vitamin A.

Sharks usually come in the wake of sardines and mackerels. A good season for these fishes means a good shark season also.

(*i*) *Carcharias gangeticus.*

English	..	.. " Ground-shark of the rivers ".
Bengali	..	.. Hangar.
Canarese	..	.. Bugga Karuvai, Baliai.
Malayalam	..	.. Voliya sravu.
Marathi	..	.. Waghsheer.
Tamil	..	.. Murdan sora.
Telegu	..	.. Sorra.

Description.

The colour of this shark is grey on the upper surface and changes to dull white near the abdomen. The so-called " obliterative colouration ", *i.e.*, the gradual fading of one colour and the inperceptible commencement of another shade, is very evident in the species of sharks. The fins are grey, but the pectoral, ventral and anal fins have a white edge. The projecting portion of the snout is 2/3 of the width of the mouth. There are 27– 30 teeth in each jaw, all serrated. There are small scales with rough edges.

This shark is very common in the Bay of Bengal and ascends rivers above the tidal influence. It is one of the most ferocious among Indian sharks.

(*ii*) *Galeocerdo rayneri.*

Canarese	..	.. Pilthatta.
Malayalam	..	.. Pullian sravu.
Tamil	..	.. Valuvan sora.
Telegu	..	.. Kettalum.

DESCRIPTION.

The colour is a general grey with a dull white abdomen. Commencing from the gile openings there are numerous large black spots and vertical bars. The fins are grey and there are irregular vertical bands in the first dorsal fin. The eyes are large. The teeth are large, compressed, and serrated and are of equa size n both jaws.

The shark attains a considerable size in the Indian seas. It is exceedingly fierce and cunning. "It swells itself up so as to appear like a floating mass of animal substance and having thus decoyed its prey it immediately attacks it. It eats everything, even sea-snakes." (Day).

Galeocerdo rayneri

(Length 12 feet or more)

"*Fishes of India*", *Day*.

THE HAMMER-HEADED SHARK
Zygaena blochii

(Length up to 4 feet)

"Fishes of India", Day

(*iii*) *Zygaena blochii.*

English	..	.. Hammer-headed shark.
Bengali	..	.. Julia, Magar.
Canarese	..	.. Kebichatte.
Malayalam	..	.. Kannankodi.
Marathi	..	.. Kanere, Zori.
Tamil	..	.. Kombansora.
Telegu	..	.. Sappa sorrah, Kama sorrah.

DESCRIPTION.

The colour is of a deep grey or brownish grey becoming lighter beneath and the fins are of a slightly deeper colour than the body. The sides of the head of this shark are produced so as to give it the shape of a hammer. The eyes are on the produced outer edges.

The first dorsal fin is spineless : the caudal fin has one notch and a pit at the commencement of the fin.

This shark rarely exceeds 4 feet in length. It is the commonest form on the west coast and the young are captured in large numbers.

(*b*) *Saw fish.*

General Characteristics.

The body is elongate and shark-like with a well developed tail terminating in a deeply-forked caudal fin. There are two large dorsal fins. The snout is produced into a long flattened "rostrum", the lateral edges of which are armed with a series of strong teeth.

Saw fishes grow to a considerable size, specimens of over 20 feet in length and "Saws" 6 feet long and a foot wide across the base, are not uncommon. These fishes strike sideways with their formidable snouts and have been known to cut a bather completely into two. The Indian species are known to ascend rivers beyond tidal influence.

The flesh is equally esteemed with that of the sharks. The fins are prepared and sent to China and oil is extracted from the livers.

Pristis cuspidatus.

English	..	.. Saw fish.
Bengali	..	.. Khanda magar.
Canarese	..	.. Chakku-thatte.
Malayalam	..	.. Valu sravu, Makora sravu.
Marathi	..	.. Kandere.
Tamil	..	.. Velamin, Illupa.
Telegu	..	.. Yahla, Hathuthi meenu.

Description.

The colour is greyish yellow with a whitish abdomen. The snout is very much produced and flattened. The "rostrum" is narrow and is armed with 23—35 pairs of broad teeth. The first six pairs are usually opposite one another. The fins are well-developed as in sharks. The body is scaleless.

This fish can cause great injuries with its formidable snout. The largest size recorded in India was a specimen 11 feet long. This fish also ascends rivers in search of food.

The Saw Fish

Pristis cuspidatus

(Length up to 14 feet)

From a photograph of a model in the Indian Museum, Calcutta.

THE SKATE

Rhynchobatus djeddensis

(Length up to 6 feet)

"Fishes of India", Day.

(o) *Skate.*

General Characteristics.

The head-portion is greatly flattened and wedge-shaped in outline. Behind the pectoral fin the body assumes the usual sub-cylindrical shape. The trunk gradually tapers towards the tail.

Skates are very common in the Indian seas during the cold weather. These are believed to be " shore-fishes " which migrate to deeper waters as they grow large. Their plentiful supply during the cold season is ascribed to their coming close to the shore to produce the young.

Probably due to their unusual appearance and their apparently scaleless skin, skates are not consumed as food except by the poorer people. The flesh, however, is nutritious and quite digestible. Indeed the flesh of these fishes is said to be practically indistinguishable from that of the European skates which are highly esteemed as food.

Several species are found in the India waters

Rhynchobatus djeddensis.

English	..	.. Skate.
(Bombay)	..	.. Lang.
(N. Canara)	..	.. Fadka.
Canarese	..	.. Etti-balliar.
Malayalam	..	.. Varithalai.
Marathi	..	.. Ranja.
Tamil	..	.. Kachu uluwai.
Telegu	..	.. Walawah tankee, Nululavi.

Description.

The colour is dull grey on the back and whitish (sometimes tinged with red in the young) near the abdomen. The body and sometimes the pectoral fins, are spotted with whitish or light grey spots. The snout is elongated and the eyes are large. There are minute scales of irregular sizes and shapes. A number of tubercles (*i.e.* granular projections) exist in rows in some parts of the body. The teeth are oval and wide with a horizontal cusp across the centre of each.

Attains about 6 feet in length. This fish is considered nourishing when eaten salted or fresh and the oil from the liver is much esteemed. Caught in large numbers along the east coast in the month of March

(d) *Ray.*

General Characteristics.

The body is flattened, forming with the largely developed pectoral fins a more or less flat disc. All species have a thin and slender tail. The dorsal fin when present is in the caudal portion of the body. The anal fin is absent.

Rays are found in large numbers in the Indian seas. They attain to great sizes and are much dreaded by the fishermen owing to the wounds they are capable of inflicting with their caudal spines. They mainly inhabit the "Continental shelf". In trawling experiments with "*William Carrick*" (Bombay), it was found that 24 per cent of the total catches were made up of rays. Rays lie concealed in the sand and suddenly encircle a fish swimming above with their long-whip-like tails and then wound the fish with their jagged tail spines. Subsequently they convey their food to their mouths by movements of their pectoral fins.

The skins yield an inferior type of shagreen. The tough skin is often used as a substitute for sand-paper. The fins are exported to China and oil is extracted from the livers.

Trygon sephen.

English	..	..	..	Sting ray.
Bengali	..	..	..	Shankush.
Canarese	..	..	..	Kottai thorake.
Marathi	..	..	..	Goval pakat.
Malayalam	..	..	..	Kottivalan, Padayan therandi.
Tamil	..	..	..	Attuvalan tirukkai.
Telegu	..	..	..	Belugiri tenku.

Description.

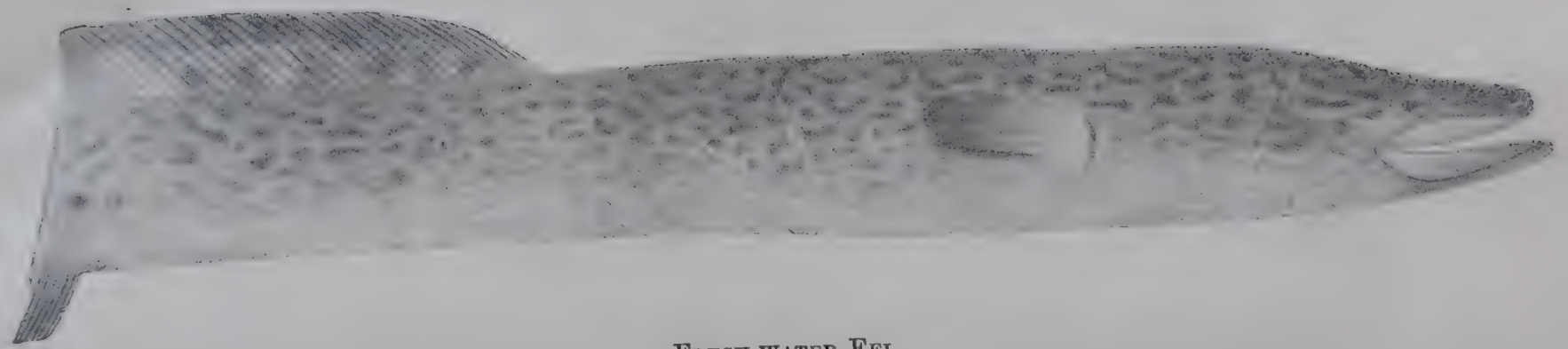
The adult ray is lead-coloured along the upper surface. The pectoral fins are developed into a wide disc which is oval. Near the snout the pectorals become confluent. The tail is elongated and tapering and is armed with one or two jagged caudal spines above and is provided with a broad cutaneous fold below. The sting rays are able to cause exceedingly dangerous injuries with these armed tails. The upper surface of the head and body, and the base of the tail are covered by thick, concave or flat headed several sided tubercles. Along the central line of the back there are three prominent smooth "tubercles", the largest being oval and the two others heart-shaped. The teeth are numerous and are arranged in a peculiar manner.

Grows to a size of about 6 feet across the disc. *Trygon sephen* is very common during the south-west monsoon when it approaches the shore.

THE STING RAY
Trygon sephen

(Size up to 6 feet across the disc)

"Fishes of India", Day.



10B

Fresh-water Eel

Anguilla bengalensis

(Length up to 4 feet)

"Fishes of India", Day.

(2) Eels Group.

General Characteristics.

The body is very much elongated, generally cylindrical or band-shaped. Vertical fins when present are generally confluent. In some species the dorsal and anal fins may be separated by a projecting tail. The ventral fins are absent. The pectoral fins may be present or absent. Scales are not also always present. When present they are small and rudimentary.

Some of the eels, especially of the genus *Anguilla* are katadromous, *i.e.* they descend to the sea and often travel far out to spawn.

The eels are among the most voracious of the carnivorous fishes. They eat most inland fishes, especially the game fishes. They attack any object when disposed and their bite is vicious.

Eels resemble snakes. Hindus generally avoid this fish owing to its resemblance to snakes and the Muhammadans dislike it owing to its scaleless nature. They are, however, very good eating and "the odour of cooking eels is said to make a dead man sniff" (Moses). They are recommended in South India as diet for invalids.

There are freshwater eels and eels found only in the seas and estuaries. The freshwater varieties attain enormous sizes but are eaten only by the poorer people. A peculiar method is adopted for catching eels inhabiting rivers and tanks. A small mouthed earthen pot with a bit of sheep-skin in it is left overnight in the water. The next morning when the pot is taken to the surface, "the fish is lying coiled up most comfortably" inside. (Thomas).

(a) *Muraenesox talabonoides.*

(Marine species).

English	..	..	..	Eel.
Bengali	..	..	..	Bam.
Malayalam	..	..	..	Pambu-meen.
Marathi..	..	..	..	Vam, bale.
Tamil ..	..	..	..	Vilangu, Kuzhippambu, Kotah,

Description.

The colour of the fish is silvery, becoming white on the abdomen. Vertical fins are yellowish, with a narrow black outer border.

The gill openings are wide. The snout is very elongated with a long upper jaw. The dorsal fin, the anal, the caudal and pectoral are well developed. The fish is scaleless. There are numerous fine teeth in both jaws.

The fish is said to grow to a length of 6 feet. During trawling experiments with "*William Carrick*" (Bombay), the eels caught were as much as 5 feet in length and 9-10 lb. in weight.

(b) *Anguilla bengalensis.*

(Fresh water species).

Marathi	..	Ahir
Tamil ..	..	Serampambu.
Chittagong	..	Salais, cuchia.

DESCRIPTION.

The colour is brownish along the back becoming yellowish on the sides and beneath. The whole of the upper surface of the body is covered with black spots and blotches.

Head is broader than the body. The snout is not broad and the lower jaw is prominent. The mouth is wide and the lips are well developed. Teeth, numerous, present in both jaws.

Length of head=1/3 of the distance between the snout and the vent and of tail 3/7 more than the trunk.

This eel attains 4 feet in length. "It is an irritable creature, swelling its head whenever angered ; and constantly when it can bury itself in putrescent carcases" (Hamilton-Buchanan).

(3) Cat-fishes Group

General Characteristics.

This group popularly termed "Cat-fishes" due to the presence of a number of "feelers" (barbels) arranged round the mouth, consists of several species found in fresh water, estuaries and the seas. The body is scaleless. There is a single rayed dorsal fin and generally also an adipose fin. Barbels are present and generally they are long. The group contains fishes of all sizes and shapes, but they all have an unmistakable family resemblance.

"They mostly prefer muddy to clear water and the more developed the barbels the more the fishes appear to be adapted for an inland or muddy fresh water residence. The wider and deeper the rivers the more suited they are for the *siluridae* (Cat-fishes). Consequently the larger forms are comparatively rare in the South of India while they abound in the Indus, Jumna and Ganges" (Day).

In the genus commonly found in the Indian seas (*Arius*) the males are known to carry the ova and the young in their mouths until the young ones are able to shift for themselves.

Some of the species have well developed accessory respiratory organs which enable them to oxygenate their blood directly with atmospheric air. These "air breathing" fishes are important in the sunderbans in Bengal where an extensive trade is carried on and ingenious methods have been evolved to sell fish in the live state. These are described under the "Live-fishes Group" (*vide infra* pp. 47—50).

Species of Commercial Importance.

(*a*) Marine	Arius dussumieri	
	Arius sona.	
(*b*) Fresh water	(i) Wallago attu.	
	(ii) Bagarius yarrellii	
	(iii) Pangasius buchanani.	
	(iv) Silundia gangetica	
	(v) Macrones seenghala.	
	(vi) Pseudeutropius garua.	

(a) *Marine.*

(i) *Arius dussumieri.*

English	..	..	..	Cat-fish.
Canarese	..	..	..	Mogam shede.
Malayalam	..	..	..	Valia-etta, Oonan-etta
Marathi..	..	..	..	Shingala.
Tamil ..	..	..	..	Mandai keleru.
Telegu ..	..	..	..	Jedi jella.

DESCRIPTION.

The colour of the fish is bluish along the back which becomes a shade whiter near the abdomen. The fins are black on the outside.

Length of head 1/4 and of the tail fin 1/5 of the total length.

The head is flat with a prominent upper jaw. There is a constriction in the tail behind the adipose fin. There are a few scattered granulations on the upper portion of the head. Two pairs of barbels present. The maxillary pair reach just beyond the base of the pectoral fin : the mandibular pair is not quite so long. The caudal fin is deeply forked. The first dorsal fin is as high as the body and its spine is serrated all along the hind edge and along the upper half of the front edge. The teeth are conical in shape.

Grows to about 24″ in length and is common on the west coast of India.

The fish is extensively salted and dried.

(ii) *Arius sona.*

English	..	..	..	Cat-fish.
Canarese	..	..	..	Shede.
Malayalam	..	..	..	Etta.
Tamil ..	..	..	..	Keluthi.
Telegu ..	..	..	..	Jellalu.

DESCRIPTION.

The colour is brown on the back and bluish and golden on the sides. The abdomen is dull white. Fins have a blue-black tinge.

Length of head 1/4 and of the tail fin 1/6 of the total length.

The head is flat and the upper jaw is long. The crown of the head from behind the eye is granulated and these granulations seem to radiate in all directions. Barbels-2 pairs. The maxillary reach to the end of the head. The mandibular pair is shorter.

The dorsal spine is strong, granulated anteriorly and serrated posteriorly. The caudal fin is forked. The eyes are large.

This cat-fish is said to reach 3 feet in length. It is commonly found along the Bombay coast and occasionally ascends tidal rivers.

CAT-FISH

Arius sona

(Length up to 3 feet)

Fishes of India", Day.

FRESH-WATER SHARK

Wallago attu

(Length up to 6 feet)

Reproduced from the Journ. Bombay Nat. Hist. Soc. Vol. XLI, facing p. 64

(b) *Fresh-water.*

(i) *Wallago attu.*

English	..	..	.. "Fresh-water shark".
Assamese	..	..	.. Poil, Barali.
Bengali	..	..	.. Boyali, Keyali.
Hindi ..	..	..	.. Boalee, Parhin, Lanchi.
Malayalam	..	..	.. Vala.
Marathi..	..	..	.. Shivada, Pari, Purram.
Punjabi..	..	..	.. Mulley
Tamil ..	..	..	.. Valai, Tele.
Telegu ..	..	..	.. Wallagah.
(Manipuri)	..	..	.. Sareng.
(Rohtak)	..	..	.. Painda.
(Hyderabad)	..	..	.. Pattan.

DESCRIPTION.

The colour of the fish is uniform grey somewhat darker above and lighter beneath. The fins are sometimes covered with fine dots. It is a straight-backed fish, long-bodied and narrow. It has a long snout with a slightly projecting lower jaw. The cleft of the mouth is very deep.

Length of head = 1/5 of the total length.

It has 2 pairs of barbels : one long pair on the upper jaw and a short one in the lower. The anal fin is very long and ends near the caudal. One very short spineless dorsal fin is present which is situated above or very slightly before the ventral. The caudal fin consists of two rounded lobes. The head and body of the fish are covered with soft skin.

The fish grows to a size of 6 ft. The specimens usually coming to the markets are $1\frac{1}{2}$ to $2\frac{1}{2}$ ft. in length.

It is found in deep still pools in clear streams and in large tanks. It is said to be a "voracious and not a very clean feeder" (Day). It is not popular for stocking tanks because it devours other fish. It is a good game fish.

(ii) *Bagarius yarrellii.*

Assamese	.. .. ..	Baghmachh, Goreah.
Bengali	.. .. ..	Baghari.
Hindi	.. ..	Boonch, Goonch.
Marathi	.. ..	Mutanda. Tharota.
Oriya	.. ..	Sahlun.
Telegu	.. ..	Rahti-jellah.
(Purnea)	.. .. ..	Vaghair.
(Poona)	.. .. ..	Kheerd.

DESCRIPTION.

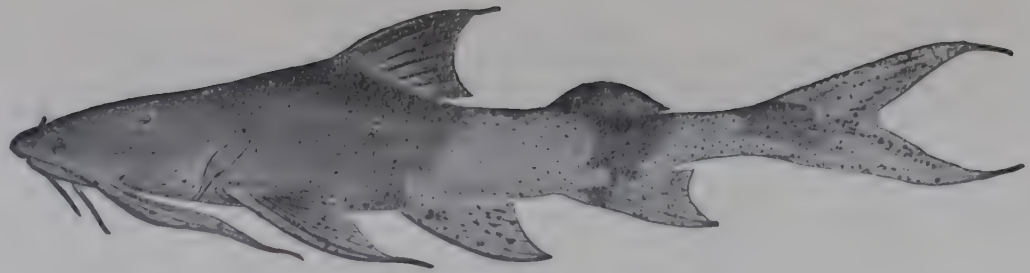
The colour of the fish is grey or yellowish with large irregular brown or black markings and cross-bands. There is a dark band across each fin and the base of all the fins is black. It is an ugly looking fish with a spatulate head and a body tapering gradually towards the tail.

Length of head and tail fin, each 1/4 of the total length.

The mouth is set forward, the upper jaw projecting over the lower. 4 pairs of barbels present : a nasal pair, a pair on the upper jaw and 2 pairs on the lower jaw. The maxillary pair is large and fleshy. The jaws are armed with pointed unequal teeth. There are whip like prolongations to the upper lobe of the caudal fin and the pectoral fins. The caudal fin is deeply forked.

The fish grows to an enormous size, specimens measuring 7 feet being reported. Day says it attains 6 feet or more and records one measuring 5 feet and weighing 136 lb. The usual size sold in the markets is $1\frac{1}{2}$-2 feet.

The goonch is found in all the large rivers in India. Thomas says that this is probably the largest fish caught on rod and line in India. It is, however, not very populer with anglers.

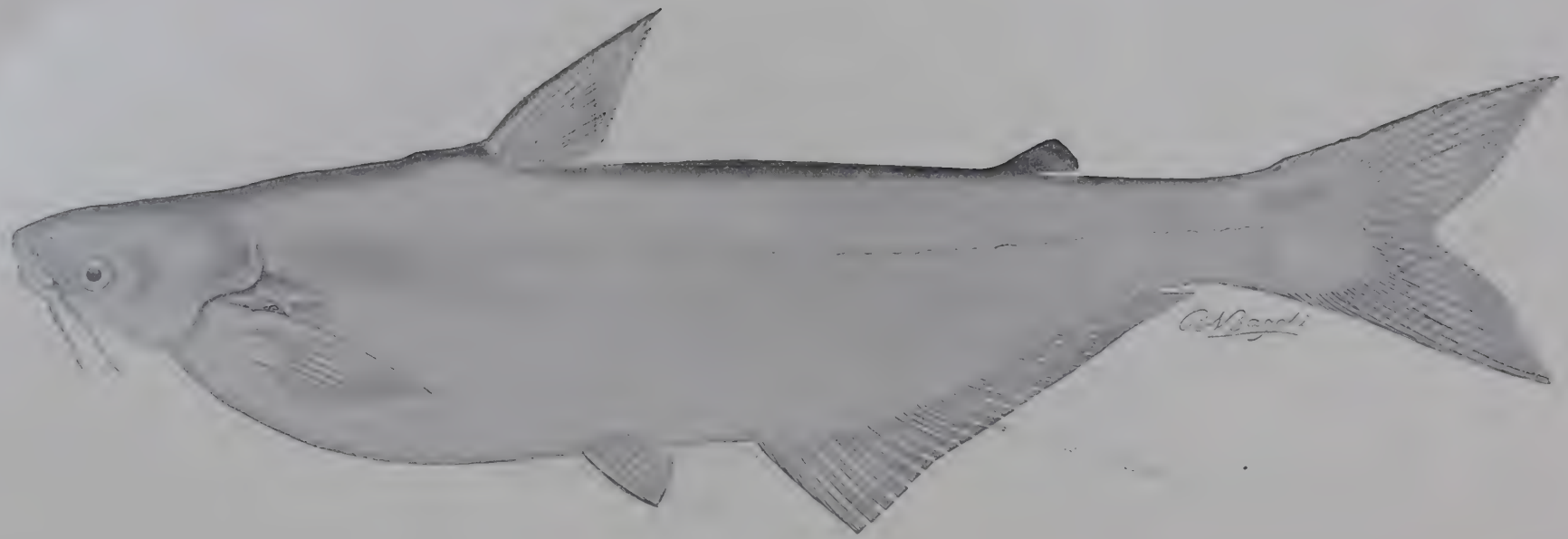


THE GOONCH

Bagarius yarrellii

(Length up to 6 feet)

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XL, facing p. 583



THE PUNGAS CAT-FISH

Pangasius buchanani

(Length 4 feet or more)

Reproduced from the Journ. Bombay Nat. Hist. Soc. Vol. XL, facing p. 355

(iii) *Pangasius buchanani*.

English	Pungas cat-fish.
Bengali	Pungwas or Pungas.
Hindi	Pariasi.
Oriya	Jellum.
Tamil	Kovail, Oolakeluthi, Kitchan.
(Nathpur)	Pangsa.

DESCRIPTION.

In specimens freshly taken out of water, the back is yellowish green which fades into bluish mauve above and light mauve on the sides. The lower half of the body is silvery white with a reddish tinge in front. The sides of the head are golden yellow. The fins are light reddish yellow. The head is flat. There is a deep constriction in the tail behind the adipose fin.

Length of head 1/5 and of tail fin 1/5 (approximate) of the total length.

The fish has two pairs of barbels of which the maxillary pair reaches the base of the pectoral fin. The caudal fin is deeply forked and the upper lobe is slightly the longer.

"This species attains upwards of 4 feet in length and is a foul feeder" (Day). It is found in all the large rivers and estuaries of India.

(iv) *Silundia gangetica.*

English	Silond cat-fish.
Bengali	Silun (immature specimens).
Bengali	Dhain (large specimens).
Hindi	Baikar, Banspati.
Oriya	Ji-lung.
Punjabi..	Silond.
Tamil	Ponatti.
Telegu	Wanjou.
(Calcutta)	Silondia vacha.

Description.

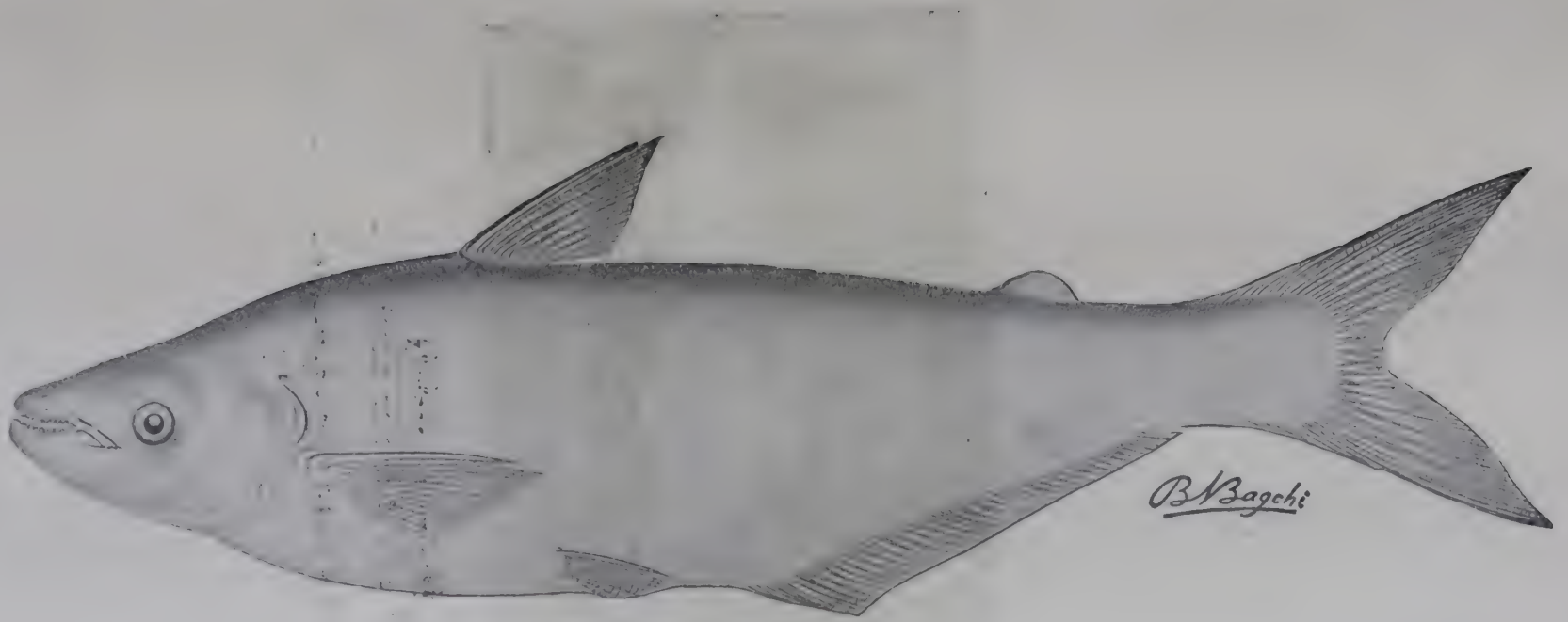
The back is somewhat of a dusky green colour. The sides are silvery. The fish has a dirty lurid appearance with a shade of livid hue. The fins have a light purple or orange colour.

The length of the head=1/5 of tail fin also 1/5 of the total length.

This fish is herring-shaped in its younger stages : but in the adult condition its belly becomes very bulky and pendulous. The mouth is slightly ascending. The lower jaw is broadly pointed in the middle and somewhat longer than the upper. The lips are red. A pair of minute maxillary barbels present. The dorsal spine is slender. There is a small adipose fin. The caudal fin is deeply forked and both the lobes are of equal length.

The specimens usually sold are about 3 feet in length though the fish is known to grow to a size of 6 feet.

The silond cat-fish is very common in the gangetic estuaries and is considered good eating. It seems to prefer stronger streams and clear deep waters. It is very voracious.



THE SILOND CAT-FISH

Silundia gangetica

(Length up to 6 feet)

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XL, facing p. 137

Macrones seenghala
(Length 2 feet or more)

From a photograph of a model in the Indian Museum, Calcutta

(v) *Macrones seenghala**.

English	.. .. ..	Giant River Cat-fish.
Assamese	.. .. ..	Auri.
Bengali	.. .. ..	Air, Aor.
Hindi, ..	.. .. ..	Ari, Pogal.
Marathi..	.. .. ..	Singala*, Singhata.
Oriya ..	.. .. ..	Alli, Addi.
Punjabi..	.. .. ..	Chaija, Shingoa.
Tamil ..	.. .. ..	Cumboo-keluthee.
Telegu ..	.. .. ..	Mukuljella, Multijella.
(United Provinces)	.. ..	Tengara, Tengan.

DESCRIPTION.

The colour of the fish is dark brown along the back becoming lighter beneath. There is a black spot near the base of the adipose fin.

Length of head==1/4 and of tail fin 1/4 of the total length.

The snout of the fish is chisel-shaped. There is a constriction in the tail portion of the body commencing from behind the adipose fin. The caudal fin is deeply forked, the lobes are pointed and the upper lobe is slightly the longer. There are 4 pairs of barbels: the longest (maxillary) pair reaches to the end of the pelvic fins.

The fish grows to a considerable size. The usual bazaar specimens are about 20 inches long. It is found in the Indus, Yamuna, Ganga and also in the Deccan rivers.

*In Bombay Province 'seenghala' is a name for Cat-fishes in general.

(vi) *Pseudeutropius garua.*

English	.. .. ..	Butchwa.
Assamese	.. .. ..	Bacha, Basa.
Bengali	.. .. ..	Vacha.
Hindi ..	.. .. ..	Sugwabachoya.
Oriya ..	.. .. ..	Butchwa, Nandi-butchua.
Punjabi..	.. .. ..	Jhalli, Dhuan, Baiki.
(Lakshmipur)	.. .. ..	Tunti, Caingun.
(Purnea)	.. .. ..	Katla.

DESCRIPTION.

The colour of the fish is silvery : but along the back there is a greyish neutral tint. There are vermilion patches of different shades on the jaws, upper and lower margin of the orbit, gill-cover, and along the ventral edge of the body. All the fins are of a greyish neutral tint.

Length of head=1/6 of the total length.

The body is elongate and compressed. The head is covered with soft skin. The snout is pointed and generally it is sharp. The mouth is wide and ascending. The eyes are lateral and are provided with broad adipose lids. There are 8 barbels : one pair nasal, one pair maxillary and two pairs mandibular. The jaws are provided with several rows of sharp teeth. The pectoral fin is provided with a spine. The anal fin is long, but is separated from the caudal fin by a considerable distance. The caudal fin is deeply forked with both the lobes pointed.

There are two types of cat-fishes which are called " Butchwa " by the anglers and the fishermen. In some places both species are found in abundance. Both are good eating.

Butchwa is a game fish, growing to about 15 inches and weighing 2 pounds It is found only in the rivers of northern India.

THE BUTCHWA

Eutropiichthys vacha
(Length up to 15 inches)

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XXXIX, facing p. 431

THE SILVER-BAR FISH

Chirocentrus dorab

(Length up to 12 feet)

"Fishes of India", Day

(4) The Dorab or the Silver-bar Fish Group.

General Characteristics.

The body is much elongated and compressed. There are no barbels. The abdominal edge is sharp, but the margin is not serrated (distinction from herrings). The gill openings are wide. The eyes are completely covered with adipose lids. The mouth opening is oblique and deep, with the lower jaw longer than the upper. The dorsal fin is placed far backwards and is short. Scales are present, but are thin, small and deciduous.

Chirocentrus dorab.

English	.. .. ..	Silver-bar fish.
Bengali	.. .. ..	Khanda.
Canarese	.. .. ..	Karli.
Malayalam	.. .. ..	Mullu-vala.
Marathi	.. .. ..	Karli, Datali.
Tamil ..	.. .. ..	Mullu-valai.
Telegu ..	.. .. ..	Mulluvala.

Description.

The colour of the fish is bluish-green along the back and silvery on the sides and the abdomen.

The length of head is about 1/7 and of the tail fin 1/5 of the total length.

The dorsal fin is on the last one-third of the body (nearer the tail) and is short. Along the whole length of the lower margin of the abdomen are short hair-like rays. There is one pair of prominent long sharp teeth and numerous others of irregular length.

Dorab fishery is of extreme importance on the east coast of Madras though the fish is caught everywhere along the sea-coast. At Tuticorin, the fishing proceeds throughout the year with a peak period in June. Dorab is not a migratory shoaling fish like the sardine. It is highly esteemed by the Indian public and occupies ' a place that the herring does in England" (James Hornell).

The fish is found in all Indian seas and attains about 12 feet in length. When captured it snaps at everything near it.

(5) The Herrings and the Anchovies Group.

General Characteristics.

The body is greatly compressed from side to side making the abdominal edge quite sharp. Further, the scales along this edge are modified into sharp points like the teeth of a saw. The gill openings are wide. The eyes are lateral and are provided with adipose lids. Barbels are not present. The upper j. w does not project beyond the lower. Teeth are small or absent. The fin rays are articulated. The scales are regularly arranged on the body. There are no scales on the head.

The herrings are well represented in the seas of India and are largely consumed. As a rule, they are much more abundant on the Malabar than on the Coromandel Coast. They swim in shoals near the surface generally feeding on plankton. All these species are oily.

Species of Commercial Importance.

(*a*) Herrings .. .. .. (i) Clupea longiceps.
(ii) Clupea fimbriata.
(iii) Clupea ilisha.

(*b*) Anchovies .. .. .. (i) Engraulis purava.
(ii) Engraulis telara.

THE OIL-SARDINE
Clupea longiceps

(Length up to 8 inches)

(*a*) *Herrings.*

(*i*) *Clupea longiceps.*

English	.. .. ..	Oil sardine.
Canarese	.. .. ..	Baige.
Malayalam	.. .. ..	Nalla-mathi.
Marathi..	.. .. ..	Haid, Torli.
Tamil ..	.. .. ..	Paichalai, Nonalai.
Telegu ..	.. .. ..	Noona kavallu.
(S. Canara)	.. .. ..	Buthai.

Description.

Colour.—Bluish and golden along the back : the abdomen is silvery with purple dashes and generally there is a golden line separating the colour of the back from that of the sides. There is a large greenish gold spot on the upper margin of the gill-cover. The dorsal and the caudal fins are greenish, the other fins are transparent.

The length of head is about 1/4 and of the tail fin 1/6 the total length.

The upper edge of the dorsal fin is concave. The caudal fin is deeply forked. The scales are rather large and are regularly arranged. No barbels. The eyes have broad adipose lids.

It is a shoaling fish and comes in vast numbers especially to Malabar, but is uncertain as to its movements. It is occasionally absent for many consecutive years. The adult fish contains about 10-15 per cent oil. By boiling the fish with water in large cauldrons the oil is separated and recovered. The cooked fish scrap when dried is called " guano " and is sometimes converted into fishmeal for cattle and poultry feeds. Guano contains 8 per cent nitrogen and 9 per cent phosphoric acid and the dry product weighs 20 per cent of the weight of the raw fish. Where there are no factories for handling the catches in the above manner, the fish is simply spread on the sand and sun-dried. The product obtained is called " fish manure ". It contains hardened fish oil and a large percentage of sand.

The sardine can be canned on a commercial scale in India in oil or in sauces like tomato, mustard, etc., although owing to the presence of bones and scales, the product will not be quite as tasty as the true sardines (young pilchard) of the French and Portuguese coasts. By indigenous methods the fish is also cured with salt or pickled with vinegar and spices.

(*ii*) *Clupea fimbriata.*

English	Sardine.
Bengali	Khaira.
Canarese	Pedi, Erebai.
Hindi	Charree-addee.
Malayalam	Cuttay-charlay, Chalamathi.
Marathi	Pedwa, Washi.
Tamil	Sudai.
Telegu	Kavallu.

DESCRIPTION.

The colour is bluish green along the back and silvery on the sides and the abdomen. The dorsal fin has numerous fine black dots and a prominent black mark. The caudal fin shows bluish reflections and is tipped with a dark edge.

Length of head 1/5 and of tail fin 1/4 of total length.

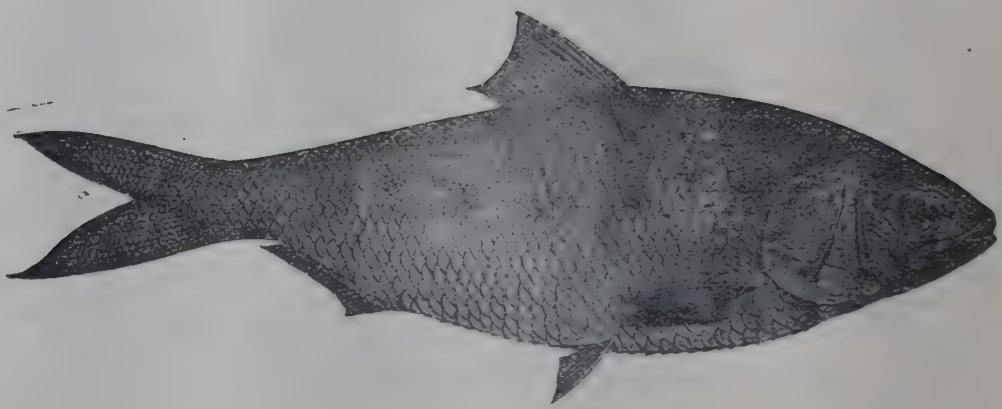
The upper border of the dorsal fin is concave. The caudal fin is deeply forked and is sprayed with scales. The scales on the body are regularly arranged. The free edges of the scales are jagged. The belly is sharp-edged and the scutes are moderately developed. The eyes have adipose lids.

This also is a shoaling pelagic fish and the shoals are migratory. This species does not become ' fat ' like the oil sardines. It is caught in fairly large quantities along both the east and west coasts. On the Coromandel coast it appears mostly during the summer season.

Clupea fimbriata

(Length up to 7 inches)

"Fishes of India", Day.



The Hilsa Fish

Clupea ilisha

(Length up to 18 inches)

"Fishes of India", Day.

(*iii*) *Clupea ilisha.*

*English	..	..	..	Hilsa fish.
Bengali	..	..	..	Hilsa.
Canarese	..	..	..	Paliya.
Hindi ..	..	..	..	Hilsa.
Malayalam	..	..	..	Paluva.
Marathi	..	..	..	Pala.
Oriya ..	..	..	..	Pussai.
Tamil ..	..	..	..	Ullam.
Telegu ..	..	..	..	Palasah.

Description.

The colour is silvery shot with gold and purple. The immature specimens have vertical dark bars across the back and the upper margin of the sides.

The length of head is about 1/5 and that of the tail fin also 1/5 of the total length.

The body is laterally compressed but the fish is rather broad. The upple edge of the dorsal fin is concave. The caudal is deeply forked and party covered with scales. The abdominal edge is sharp and serrated. Scales are silvery and are arranged in regular rows. Teeth and barbels absent. The eyes have broad adipose lids.

Hilsa swarms up all the larger rivers in India to spawn at the season of the local monsoon. Adult specimens can be caught in the Ganga from the middle of May to the middle of October. The fish ascends the river in May and presumably travels back to the sea or estuary after depositing the ova in the latter half of October.

The fish is excellent eating till they have spawned when they become lean and un-wholesome. " Their flavour has been compared to a combination of that of the salmon and herring : they are rather heavy of digestion " (Day).

The fish does not swim beyond a depth of 12 feet. Hilsa fishery is very important in Bengal and the east coast of Madras.

---

*Day notes another name "the Sable-fish."

(*b*) *Anchovies.*

(*i*) *Engraulis purava.*

English	Anchovy.
*Canarese and Malayalam	Manangu.
Marathi	Kati.
Oriya	Pussai.
Tamil	Poruva, Nethal.
Telegu	Poravallu.

Description.

The colour is silvery with a steel-blue streak along the back and a golden tinge near the head. The dorsal and the caudal fins are tinged yellowish. The other fins are uncoloured.

The head and tail fin occupy a third of the length of the fish, each being about a sixth of the total length.

The fins are all well developed. The caudal fin is deeply forked. The scales are in regular horizontal lines. Two rows of minute fine scales one each at the base of the dorsal and anal fin can be noticed. The mouth is very wide. There are fine rows of teeth in both jaws.

These fishes are small in size (10-12″), weak in muscle and are found in the warm seas. They form the food for the larger fishes. There are numerous feeble bones, but the flesh is tender and oily. The fish can be preserved in oil mixed with spices or can be made into anchovy pastes.

This is the Indian variety corresponding to the Anchovies of the English and French coasts. It is caught in fairly large quantities all along the west and east coasts.

(*ii*) *Engraulis telara.*

English	Gangetic anchovy.
Bengali	Phansa, Tel-tampri.
*Canarese and Malayalam	Manangu.
Marathi	Kati.
Oriya	Tampara.

Description.

Colour.—Greenish along the back, becoming silvery dashed with gold along the abdomen. The dorsal and the caudal fins are tinged yellowish.

Length of head is about 1/6 of total length.

The fish resembles *Engraulis purava* very closely. *Engraulis telara* attains 16 inches in length and is more common in Orissa and Bengal coasts.

* Manangu is the common Malayalam name for "anchovies"—different pre-fixes are approved to denote the species but the names vary.

The Indian Anchovy

Engraulis purava

(Length up to 12 inches)

"*Fishes of India*", *Day.*

THE "BOMBAY DUCK"
Harpodon nehereus

(Length up to 16 inches)

"*Fishes of India Day*", (*Slightly reduced*).

(6) The Bombay Duck Group.

Harpodon nehereus.

English	.. .. ..	The Bombay Duck (often for the cured form).
Bengali	.. .. ..	Nehare, Lotia.
Malayalam	.. .. ..	Bummili.
Marathi	.. .. ..	Bombil, Bummalo.
Tamil ..	.. .. ..	Vangaravasi.
Telegu ..	.. .. ..	Vanamattalu.

Description.

The fish, along the head, back and sides is semi-transparent like gelatine with minute black or brown dots. The abdomen is silvery white. The fins are transparent : but in some specimens there are black dots.

Length of head is 1/6 in the total length.

Bombay Ducks are elongate and rather compressed fishes in which the head is thick and short and which are provided with very short rounded snouts. The scales are small and transparent and can only be distinguished with great difficulty in the fresh fish. The cleft of the mouth is very wide. There are teeth in a band in both the jaws. The structural features, *e.g.*, the gelatinous consistency, large mouth and re-curved teeth on the lower jaw, indicate that it is a deep sea form, but it is not known definitely whether it is a demersal or a pelagic fish.

It attains 16″ in length. This is a shoaling fish swimming near the surface and is very common at Bombay, but decreases in numbers down the Malabar coast. It is not common in the Coromandel coast, but North of Madras along the Telegu coast it reappears in large numbers and finally is very abundant in the rivers and estuaries of Bengal. This migration has been shown to have nothing to do with reproduction of the species, but in some way connected with the marked changes in the physical condition of the waters.

It can be easily cured by drying and in this condition is known as Bombay Duck. It is highly esteemed as food whether fresh or salted.

(7) The Feather-backs Group.

General characteristics.

The whole body, excepting the head, is covered with over-lapping scales. The dorsal fin is very small: no adipose fin and no barbels. The most striking thing about the fish is the way in which the long anal fin uniting with the small caudal fin makes the tail end taper to a point. The fish as a consequence appears " tail-less ".

A fresh-water fish which can be reared in tanks, but being predaceous they are detrimental to other species.

Notopterus chitala.

English	..	..	..	The feather-back.
Assamese	..	..	..	Seetul, Kandla.
Bengali	..	..	..	Chital.
Hindi ..	..	..	..	Mohi.
Oriya ..	..	..	..	Chitul, Pulli.
Punjabi..	..	..	..	Pari, But, Moh.
Tamil ..	..	..	..	Ambutan-wahlah, Setha-kendai.
(Hyderabad)	..	..	..	Chappal mache.
Mysore ..	..	..	..	Wallak-tattah.

Description.

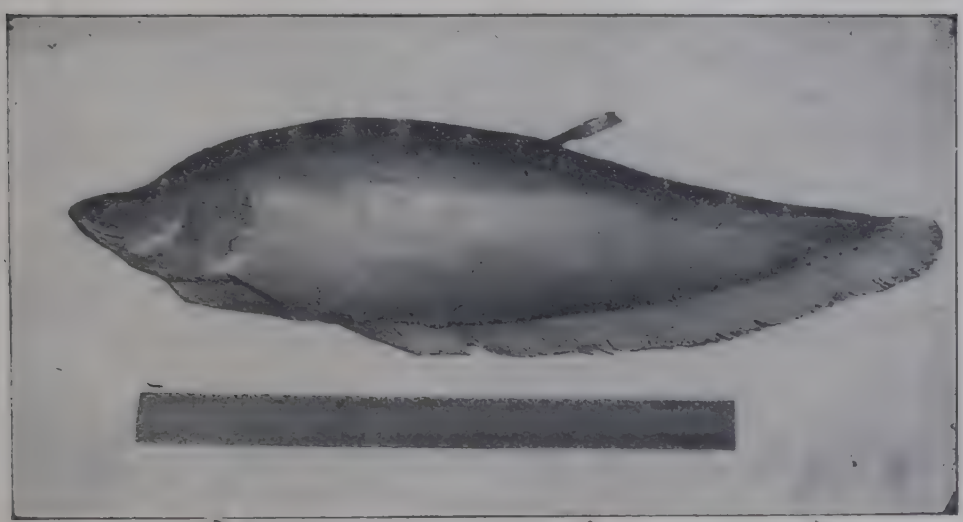
The colour is generally a silvery-white. The shade along the back is a bit dark. There are about 15 silvery transverse bars on each side of the dorsal ridge. Also there are 7 or 8 black or dark grey spots near the end of the tail. The dorsal fin is yellowish grey. The other fins are white with a dash of silver near the base.

Length of head is about 1/5 of the total length.

The body is laterally compressed. The back is strongly humped in front and the ventral profile is almost straight. Owing to the unusual length of the anal fin which extends to more than 2/3 of the whole length of the fish and which is confluent with, and almost masks a small caudal fin, the appearance of the fish is bizarre.

The fish is said to attain a length of 4 feet. 3 feet specimens are common in the markets.

It is much esteemed as food, though it is full of small bones. In Bengal a preparation called *Koptas* is made out of the flesh freed from bones.



THE FEATHER BACK

Notopterus chitala

(Length up to 4 feet)

From a photograph of a model in the Indian Museum, Calcutta.

(8) The Mackerels and the Perches Group.

General characteristics.

The body is oblong (or slightly elongated) and compressed. The gill openings are wide. The eyes are lateral and are covered with adipose lids. Teeth are present in the jaws. There are two dorsal fins : the first dorsal generally with spines. *Finlets* are invariably present. The body of the fish is covered with small scales.

Species of Commercial Importance.

(*a*) The Mackerel	Scomber microlepidotus.
(*b*) The seer fishes	(*i*) Cybium guttatum. (*ii*) Cybium commersonii.
(*c*) The Sea-perch	Lates calcarifer.
(*d*) The Cut-lass or Ribbon fish ..	Trichiurus haumela.
(*e*) Horse mackerel	Caranx crumenophthalmus.
(*f*) The Pearl Spot	Etroplus suratensis.

(a) *The Mackerel.*

Scomber microlepidotus.

English	.. ..	The Indian Mackerel.
Canarese	.. .. ..	Bangada.
Malayalam	.. .. ..	Aila.
Marathi	.. .. ..	Kaula gedar.
Tamil	.. .. ..	Kumla, Kanangalthi.
Telegu	.. .. ..	Kamangodachalu.

DESCRIPTION.

The colour along the back is greenish. The sides and the belly are iridescent and there is a row of 16 spots along the back close to the base of the dorsal fin. The head is spotted and there is a dash of purple here and there on the head. The caudal and pectoral fins are bright yellow : the dorsal is pale yellow. There are dark bands or marks on each of these fins. After death the colour of the fish becomes on the whole dull green. In large specimens the colours differ ; there are from five to eight dark longitudinal bands along the back and upper half of the body, the highest of which is occasionally broken up into spots. There are also two golden bands along the lateral line.

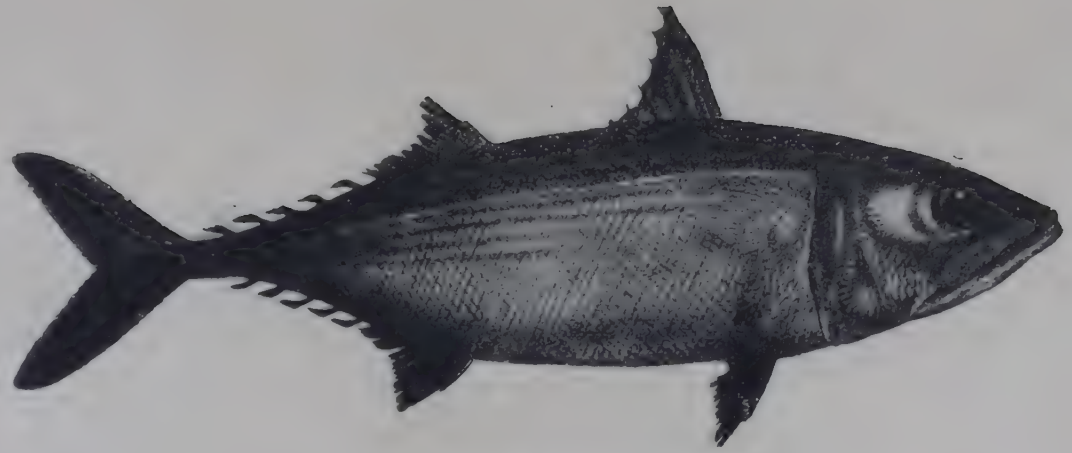
The length of head is 1/4 and of tail fin 1/5 of the total length.

The mouth is deep and the lower jaw is slightly the longer. There are teeth in both jaws. The scales are smaller above than below the lateral line the largest scales being just below the pectoral fin. There are minute scales on the second dorsal and the anal fins. The finlets (five in number) commence just behind the second dorsal fin and are opposite to and similar to those behind the anal. The caudal fin has deeply pointed lobes.

It is a swift swimming fish and swims near the surface in large shoals. The adult specimens caught in Malabar during the cold season are about 10-12" in length and weigh 3 to a pound.

The fish is extensively salted and dried in Malabar. It is not very fatty and lends itself for wet-salting and pickling. Like the mackerel of the English coast, this fish very rapidly taints and great expedition is needed in curing it. The fish can be canned in oil or may be packed as " marinated mackerel ".

It arrives in shoals in-shore during certain seasons but is very irregular in its movements.



THE INDIAN MACKEREL

Scomber microlepidotus

(Length up to 12 inches)

"*Fishes of India*", *Day.*

THE "SEER" FISH

Cybium guttatum

(Length up to 6 feet)

From a photograph of a model in the Indian Museum, Calcutta.

(*b*) *The Seer fishes.*

(*i*) *Cybium guttatum.*

English	..	..	Seer.
Bengali	..	..	Bijram.
Canarese	..	..	Khulkul, Aukulai, Jhavar.
Malayalam	..	..	Varimeen.
Marathi	..	..	Towar.
Tamil	..	..	Vanjiram, Seela.
Telegu	..	..	Vanjaramu.
(Tulu)	..	..	Anjal.

DESCRIPTION.

Along the upper surface the colour is bluish and along the lower silvery. There are three rows of round or oval spots along the back and sides, which become very distinct after death. In the young specimen the first dorsal fin is almost wholly black.

Lengths of head and tail fin are each 1/5 of the total length.

The body is somewhat elongated. The mouth opening is very deep. The spines of the first dorsal fin are weak and end in thin filamentous points projecting beyond the membrane, which is deeply notched. The pectoral fin is pointed and the caudal fin has also pointed lobes. There are about 20 finlets present, 10 on the dorsal surface and 10 on the ventral. The teeth are lancet-shaped and placed somewhat wide apart (there are about a dozen in either jaw).

It is a fish which swims near the surface and is caught in drift or gill nets. It grows to about 6 feet in length, is good eating and salts well. When about 2-2½ feet in length, it is in prime condition. The fish has to be cooked when quite fresh.

(*ii*) *Cybium commersonii.*

English	.. .. ..	Seer.
Bengali	.. .. ..	Champa.
Canarese	.. .. ..	Arkulai.
Malayalam	.. .. ..	Ayakora.
Marathi	.. .. ..	Tuvar anjari.
Tamil	.. .. ..	Mavulasi.
Telegu	.. .. ..	Yellari, Konema.

DESCRIPTION.

The colour is bluish along the back and silvery near the belly. A part of the first dorsal fin is black ; the rest of the fin is pure white having only a narrow black upper edge. The pectoral fin at its base is black. After death numerous vertical undulating lines and spots appear on the sides, but during life these markings may not be very distinct.

Length of head is 1/4 to 1/5 and tail fin is about 1/5 in the total length.

Fins etc. are similar to those of *Cybium guttatum*. The lateral line bends down making a strong curve near the commencement of the finlets and then passes direct to the centre of the caudal fin where it ends in a soft raised keel.

The fish grows to about 5 feet and is caught in drift or gill nets. The seer fish is often " light-cured " in slices. The fish is cut into longitudinal sections cleaned and immersed in saturated brine for 1-2 hours. The slices are then sun-dried.

" The seer fishes of India when of the proper size are considered the most delicate for eating of the marine forms " (Day). From $1\frac{1}{2}$—$2\frac{1}{2}$ feet in length they are in their primest condition ; above this they appear to become coarse.

THE "SEER" FISH

Cybium Commersonii

(Length up to 5 feet)

From a photograph of a model in the Indian Museum, Calcutta.

The Beckti

Lates calcarifer

(Length up to 5 feet)

From a photograph of a model in the Indian Museum, Calcutta.

(c) *The Sea-perch.*

The perches are found throughout the seas of India. They are mostly marine forms largely frequenting brackish waters and sometimes ascending into fresh waters. They are excellent as food when caught in the sea or in the estuaries. The air-bladders or *sounds* are dried and made into rough isinglass.

Lates calcarifer.

English	.. ..	Cock-up (or Beckti).
Bengali ..	.. ..	Begti.
Canarese ..	.. ..	Koliji.
Malayalam	.. ..	Chemballi, Nari-meen.
Marathi ..	.. ..	Fitadar, Khajura.
Marathi ..	.. ..	Guri (medium size).
Oriya ..	.. ..	Durruah, Bekkut.
Tamil ..	.. ..	Painee-meen, Koduva.
Telegu ..	.. ..	Panduchapa, Pandugoppa.
(Chittagong)	.. ..	Koral, Baor.

DESCRIPTION.

Along the back the fish is grey with a dash of green and along the abdomen it is silvery. During the monsoon there is a tinge of purple on this silvery abdomen.

Length of head is 1/4 and of the tail fin about 1/8 of the total length.

The body is generally oblong. The mouth is in front of the snout and has a lateral cleft on the lower side. The eyes are lateral and are large. There are two dorsal fins : the first dorsal with strong spines. The caudal fin is rounded. The scales are of moderate size and finely ctenoid.

The fish grows to an enormous size. A fish upto 5 feet in length and 200 lb. in weight has been recorded. The usual bazaar size is about 18—20 inches.

Beckti is much esteemed as food.

(*d*) *The Cut-lass or Ribbon fish.*

These are degenerate mackerels, band-shaped, with a continuous dorsal fin and long jaws armed with very fine teeth. The caudal fin is wanting and the tail ends in a hair-like filament. The Indian species are without scales. They are bright silvery in colour, very slender and very voracious, reaching a growth of 3-5 feet.

Being thin and ribbon-like these fishes can be easily dried without the use of salt. Where salt is cheap the sun-dried forms, however, are not very much esteemed. In the Malabar coast ribbon-fish is cured by brining and sun-drying.

Trichiurus haumela.

English	..	..	..	**Ribbon-fish.**
Bengali	..	..	..	**Rupa Patia.**
Canarese	..	..	..	**Pambole.**
Malayalam		..	..	**Thalayan.**
Marathi	..	..	..	**Pitiurkti, Pitiwagti, Bala.**
Tamil	..	..	..	**Savalai.**
Telegu	..	..	..	**Savallu.**

Description.

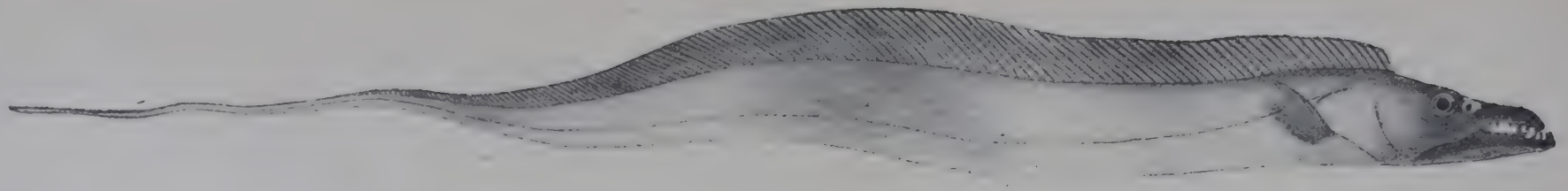
The colour is a bit greyish along the back, but is bright silvery on the sides and the abdomen. There is a dark mark on the head in front of the eye. The fins are pale yellow. The upper half of the dorsal fin is dark due to numerous fine black dots.

The length of the head is about 1/8 of the total length.

Behind the anus, sometimes, short spines with blunted extremities may be seen ; these represent the commencement of the pelvic fin.

This fish is known to devour its own species.

Trichiurus savala (Marathi : Toki, Wakati, Bale, Baga) is very similar to the species described above. The colour is uniformly silvery with yellowish fins. The anal spines in *haumela* which may sometimes be seen, are here entirely concealed. This fish is said to be found mostly along the Bombay coast.



THE CUT-LASS OR RIBBON FISH.

Trichiurus savala.

(Length up to 5 feet)

THE HORSE MACKEREL

Caranx crumenophthalmus

(Length up to 12 inches)

"Fishes of India", Day.

(e) *Horse mackerel.*

Caranx crumenophthalmus.

English	.. .. ..	Horse-mackerel.
Canarese	.. .. ..	Thiriyande, Parei.
Malayalam	.. ..	Chamban, Para, Koolipara.
Marathi	.. .. ..	Labi.
Tamil	.. .. ..	Parai, Vangadai.
Telegu	.. .. ..	Para.

Description.

The colour of the fish is silvery above and golden below. There is usually a black spot on the gill-cover. The fins are golden and are covered with fine dots.

Length of head is 1/4 and of tail 1/5 of the total length.

The body is oblong, sub-cylindrical and compressed. The eyes are lateral and quite large. Scales are present on the body, chest and cheeks. The caudal fin is deeply forked.

The fish attains a length of about 12 inches. It is a pelagic fish arriving in vast shoals in the months of September and October on the west coast of India. The flesh is coarse and there are numerous bones. Large quantities are salted and sun-dried.

Several species of horse-mackerels are found in the Indian waters.

(f) Pearl spot.

Etroplus suratensis.

English	.. .. ..	The Pearl spot.
Hindi	.. .. ..	Pitul-kas.
Malayalam	.. .. ..	Karimeen, Pallathi, Kurumpad.
Oriya	.. .. ..	Cundahla.
Tamil	.. .. ..	Karssar, Pallinchan, Seethakendai.
Telegu	.. .. ..	Cashi-mara.

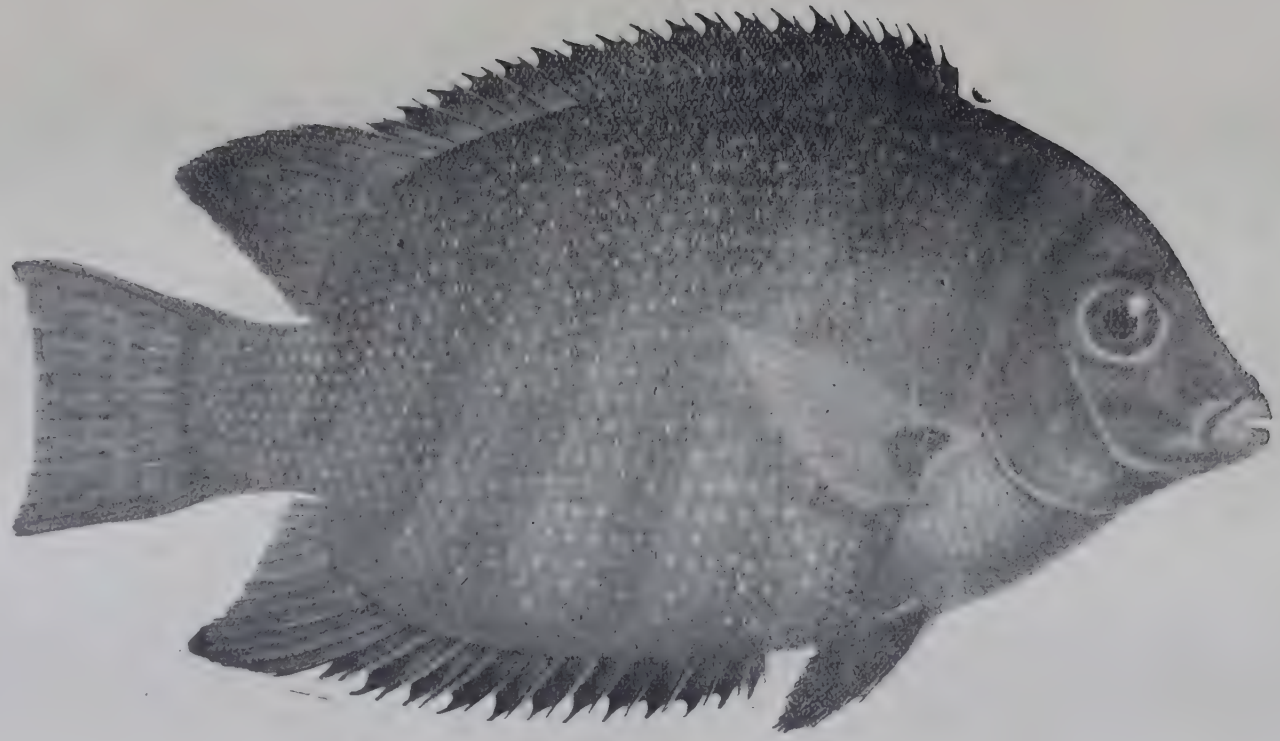
DESCRIPTION.

Light green with 8 transverse bands. Most of the scales above the lateral line have a central white pearly spot. There are some irregular black spots on the abdomen. Fins, excepting the pectorals which are yellow, are of a dark grey colour. Specimens from brackish water are of a deep purple colour. During monsoon the colouration of this fish is very striking.

Length of head=1/4 of total length.

The body is elevated and compressed. An air bladder is present. The scales are slightly ctenoid, of moderate size and extended on to the bases of the soft dorsal and anal fins. The caudal fin is slightly forked.

The fish grows to about a foot in length. It is excellent eating especially when large. It is common in the fresh and brackish water along the coast of Malabar and on the east coast as high as Orissa. Its favourite haunts are shallow creeks of backwaters and canals where there is luxurient aquatic vegetation. The fish is well suited for stocking tanks and lakes owing to its fair size. palatability, hardihood, non-predaceous habits, nest making and parental care. Breeds twice in a year—May—June and November to February.

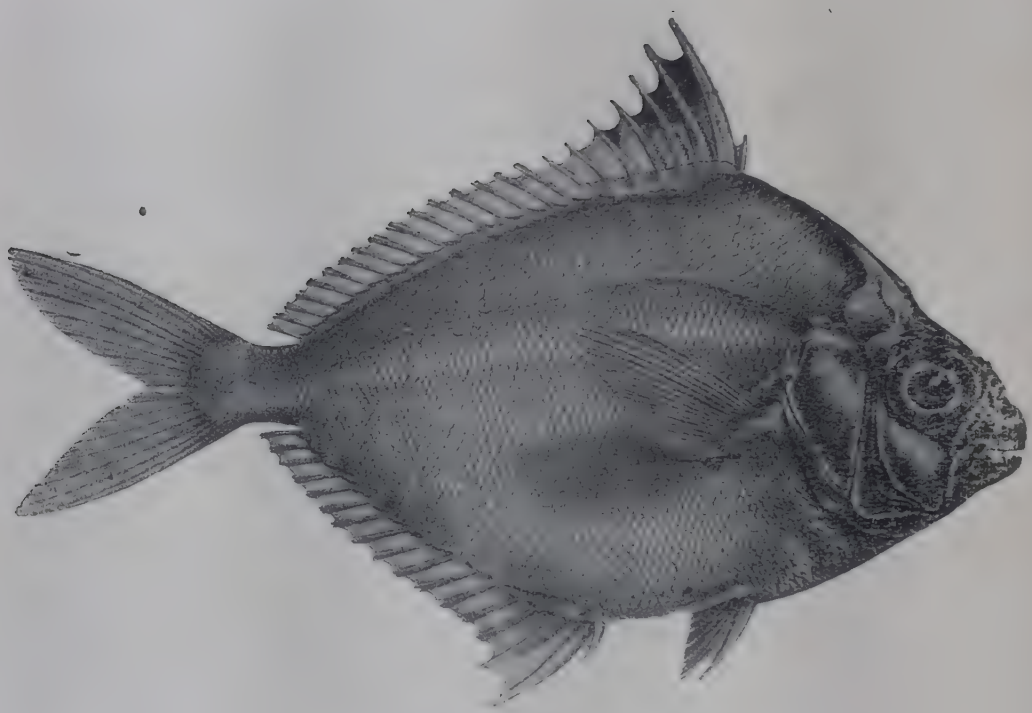


THE PEARL SPOT

Etroplus suratensis

(Length up to 12 inches).

"Fishes of India", Day.



The Silver Belly
Equula splendens

(Length up to 6 inches)

"*Fishes of India*", *Day.*

(9) The "Silver-bellies" Group.

The fishes in the two genera *Equula* and *Gazza* are collectively called the silver-bellies. The several species are very similar to one another. The description of a typical fish is given below.

General characteristics.

The fishes are usually small and bright silvery in appearance. The bodies are strongly compressed. The mouth projects in front. There is a single dorsal fin with spines and rays. There are no finlets. The scales are small and cycloid. Some species have a black patch on the spinous dorsal fin.

These small fishes are extensively sun-dried in India. They are thin and bony and can be satisfactorily cured by soaking in sea-water (sometimes partially evaporated) and drying in the open air.

Equula splendens.

English	Silvery-belly.
Bombay	Surgutta.
Canarese	Kanaikurichi.
Malayalam	Thali-mullan.
Marathi	Katali or titaka.
Tamil	Karal, Chuthumunan-karai.
Telegu	Karalu.

Description.

The colour is bright and silvery with a black blotch on the dorsal fin. There is also a black mark over the snout.

Lengths of head and tail fin are each 1/4 of the total length.

The fins are strong and well developed. The caudal fin is deeply forked. Scales are distinct but are in irregular rows. There are scales on the breast and chest with a large one at the base of the ventral fin.

The fish attains a size of 5--6 inches in length. It is caught in very large quantities on the Malabar coast in the months of August-September and May-June.

Salted "Silver-bellies" known as "Caraputty" in Malabar is reputed to be good for patients suffering from Malaria.

(10) The Pomfret Group.

General characteristics.

The pomfret is a flattened fish but it is not a " flat fish " in the same sense as the *plaice* and *dab* of British waters. These Atlantic species have both their eyes and all the colouring matter on one side of the body only and have the habit of lying on the sand at the bottom of the sea. The pomfret has normal eyes, on either side of the head, and is coloured similarly on both sides of its body. Pomfrets are certainly not bottom-swimming fishes, though they cannot be called pelagic.

The pomfrets are the best known and most popular among the sea-fishes.

Species of Commercial Importance.

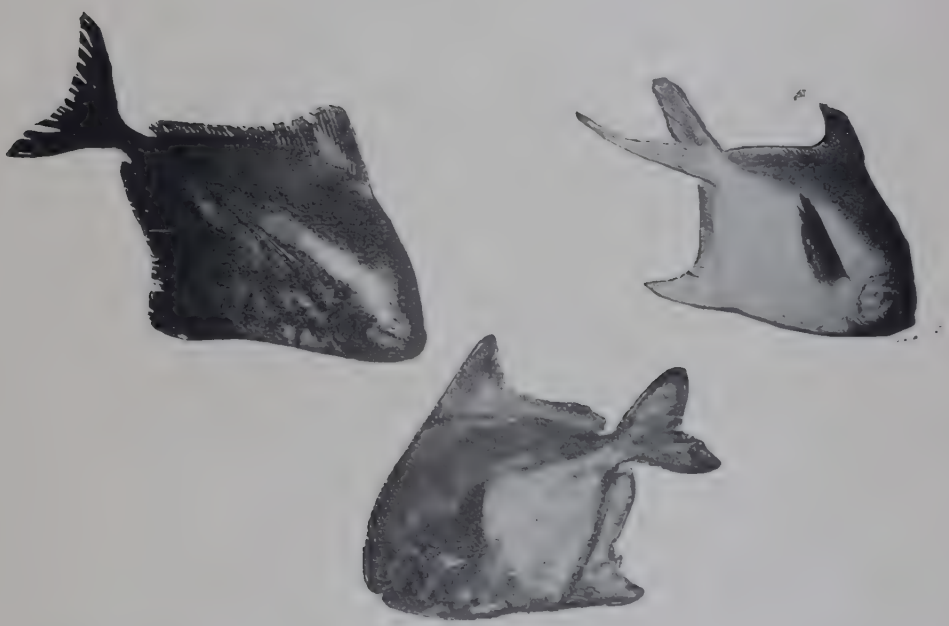
(*a*) The silver pomfret	..	Stromateus cinereus.
(*b*) The White pomfret	..	Stromateus sinensis.
(*c*) The Black pomfret	..	Stromateus niger.

(*a*) *The silver pomfret*

Stromateus cinereus.

English	..	The Silver pomfret.
Bengali	..	Chanda.
Canarese	..	Manji.
Malayalam	..	Vella avoli.
Marathi	..	Chandava.
Tamil	..	Vavval, Mogang vavval.
Telegu	..	Chenduvallu, Chedalu, Thella chanduvallu.
(Bombay)	..	Saranga.

The Pomfrets



Black pomfret (Stromateus niger). Silver pomfret (S. cinereus). White pomfret (S. sinensis).

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XXXV, facing page 77.

Description.

The back of the fish and the upper surface of the head are of a greyish tint with purple reflections. The sides of the head and the body proper are silvery grey and the colour gradually fades to white on the abdomen. The skin is covered everywhere with minute black spots. There are also black dots on all the fins.

Length of head is about 1/4 and that of the tail fin also 1/4 of the total length.

The body is flattened and slightly elevated. The spines of the dorsal fin appear truncated above the skin. The caudal fin is deeply forked and the lower lobe is the longer. Scales are small and deciduous.

Silver pomfrets grow to about a foot in length and the adult specimen weighs about 2 pounds. The season for pomfret commences about October in Bombay coast, the largest quantities being marketed between November and February. The shoals appear to migrate south-wards after February and pomfrets become plentiful in South-Canara coast between March and April and further south, in the Malabar Coast, between July and August. A similar southerly migration seems to take place on the East coast of India also. Pomfrets are plentiful in the northern part of Bay of Bengal in January and February, while they become abundant in the Madras city only between June and November.

(*b*) *The White pomfret.*

Stromateus sinensis.

English .. .. .. The White pomfret

(The other vernacular names apparently are the same as for the silver pomfret).

The fish resembles the Silver pomfret in all respects, only there are certain subtle colour changes. This species is rare in Bombay but is common on the Malabar coast during the south west monsoon. It is the commonest pomfret in the Madras market and is quite plentiful on the Bengal coast. It is considered as the best flavoured of the three species.

(*c*) *The Black pomfret.*

Stromateus niger.

English	..	..	.. The Black pomfret.
Canarese	..	..	.. Chandratya.
Marathi	..	..	.. Halwa, Chamua, Kaula, Vinga, Inang.
Malayalam	..	..	.. Karapu avoli.
Tamil	..	..	.. Karapu vavval.

Description.

Very similar to stromateus cinereus described on a previous page. Only the colour is deep brown or greyish brown with blue reflections. The abdomen and the fins are also brownish. The tail is yellow with three brown cross bands.

(11) The Flat Fishes (The Soles and the Tongue fishes) Group.

General Characteristics.

The body is so greatly compressed that these fishes swim horizontally or lie flat on the sand. On the side which is uppermost both eyes are placed, this side being also coloured brown or grey. The lower side is usually plain white. In certain species the right side is uppermost, in certain others the left. The soles have the eyes on the right side and the tongue fishes on the left and in both types the eyes are not separated by a bony ridge.

The flat fishes prefer sandy or gravelly shores, but are uncertain in their migrations. They seem to appear at certain spots almost at a given time every year, but in other seasons disappear as suddenly as they arrive.

The flesh is white, firm and of excellent flavour, those from deepest waters being generally preferred.

There are several fishes in this group of which only one typical flat fish (*Plagusia bilineata*) is described here as an example. All the species are edible and equally esteemed as food.

Plagusia bilineata.

English	Sole.
Canarese	Nangu.
Malayalam	Manthal*.
Marathi	Rhepti, Shivra.
Tamil	Aralu.
Telegu	Jerry-potoo
(Chittagong)	Koo-koor jib.

Description.

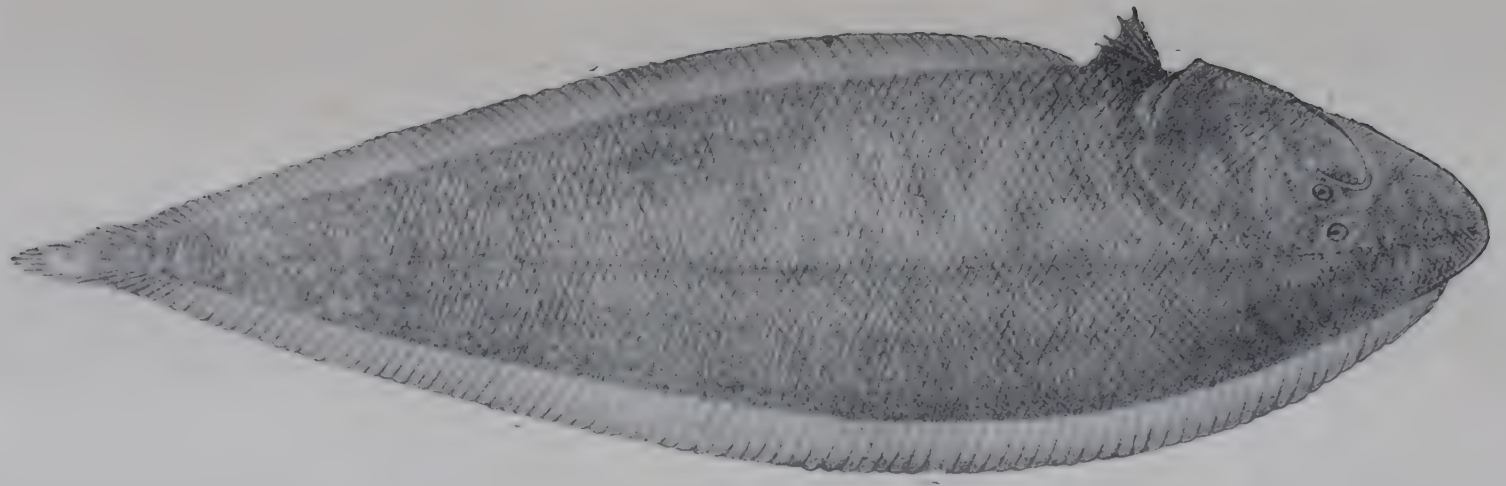
The colour of the fish is bluish-black. The colour of each scale on the body is lightest in its centre. The fins have a dull orange colour.

Length of head=1/4 of the total length.

The eyes are situated in the middle of the head on the right side. Nostrils are present on both the coloured and blind sides. There is a single ventral fin which is attached to the anal. There are two "lateral lines" on the coloured side and a single line on the blind side.

This fish attains a size upto 10" in length.

*Manthal is the common Malayalam name for flat-fishes: different pre-fixes are used to denote the different species.



THE SOLE

Plagusia sp

"*Fishes of India*", *Day.*

(12) The Mullets Group.

General characteristics

The mullets can be broadly divided into two types *viz.*, the fresh-water mullets and the marine mullets. In the marine species the scales are usually cycloid, *i.e.*, the outer margin of each scale is curved and smooth, whereas in the strictly fresh-water varieties the scales are definitely ctenoid, *i.e.*, the outer edge is in the form of tooth-like spines. The body is oblong and compressed, the head and the dorsal surface being slightly bent forward. The mouth opening is narrow and there are very fine teeth.

Mullets are distributed throughout the Indian seas and some are found in the tidal rivers and the estuaries. The young are found in the water courses intersecting the paddy fields and in inundated localities. The strictly fresh-water forms seem to be confined to the larger rivers such as the Ganga, Yamuna and the Indus.

When of sufficient size they are excellent as food. Mullets are extensively salted and dried. Large mullets putrefy very rapidly in the hot weather.

Species of Commercial Importance.

(*a*) Fresh-water .. .. Mugil corsula.

(*b*) Marine .. .. .. Mugil speigleri.

(*a*) *Fresh-water.*

Mugil corsula.

English	.. .. ..	Mullet
Bengali	.. .. ..	Elanga, Arwari, Corsula, In-gelee.
Hindi	.. .. ..	Andwari.
Malayalam	.. ..	Thiruta.
Oriya	.. .. ..	Kakunda.
Punjabi	.. .. ..	Hurdwahre.

DESCRIPTION.

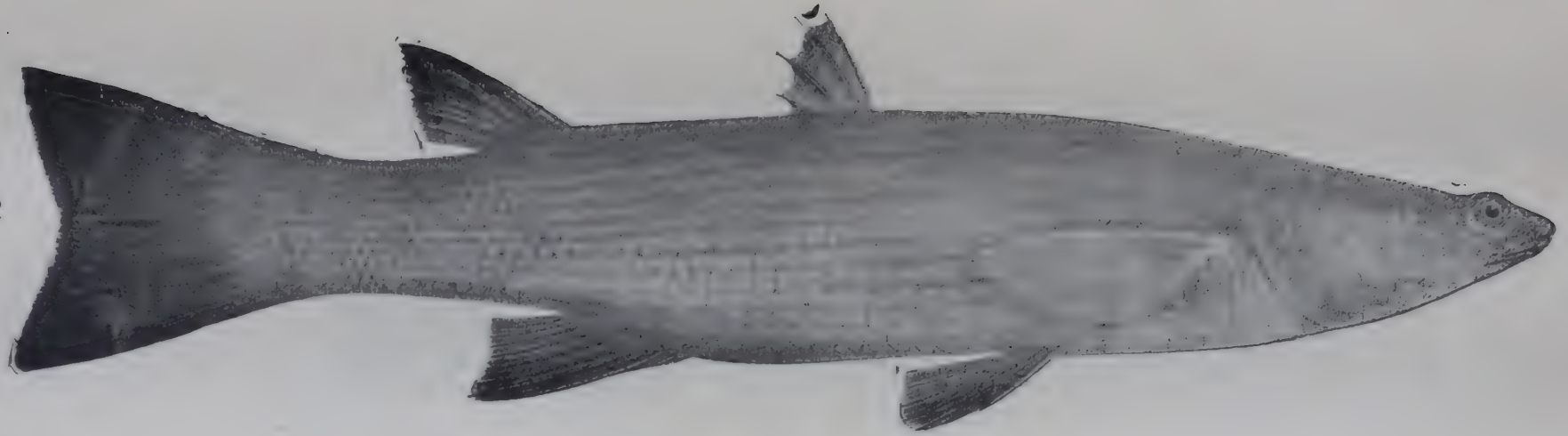
The colour is dull brown along the back and of a lighter shade on the abdomen. The dorsal and the caudal fins are stained with grey. The eyes are golden in colour.

Length of head = 1/5 of the total length.

The head is depressed and the dorsal profile is nearly straight. The upper jaw is longer than the lower and the upper lip is thick. The eye is without an adipose lid and is elevated (*i.e.*, " pops out of the skin"). The fins are well developed. The caudal fin is slightly forked. Scales are finely ctenoid and there is a slightly raised line along the middle of each row. There are a few scales on the dorsal, anal and the caudal fins.

The fish grow to a size of 18—20". They swim with their eyes just above the surface of the water giving the appearance of a number of tadpoles. Immediately they are disturbed they dive down with great rapidity.

Found above the limit of tidal influence in the rivers and estuaries of Bengal, and in other large rivers.



THE FRESH-WATER MULLET.
Mugil corsula.
(Length up to 20 inches)

"Fishes of India", Day.

THE MULLET
Mugil speigleri
(Length up to 14 inches)

"Fishes of India", Day.

(*b*) *Marine.*

Mugil speigleri.

English	.. .. ..	Grey mullet.
Bengali	.. .. ..	Bhangon*.
Canarese	.. .. ..	Shevta, Pare.
Malayalam	.. .. ..	Thirutha, Maalan.
Marathi	.. .. ..	Mangin boir.
Oriya	.. .. ..	Nakora.
Tamil	.. .. ..	Authumeen, Manalai, Madavai.
Telegu	.. .. ..	Bonthalu, Kanisalu, Moyalu.
(S. Kanara)	.. ..	Majni.

DESCRIPTION.

The colour is greyish above and silvery below. The sides of the head are golden. The tips of the dorsal fins are black. The free margin of the caudal fin is grey. There is a dark spot at the base of the pectoral fin.

Length of head = 1/5 of the total length.

The body is oblong and compressed. The fins are well developed. The caudal fin is slightly forked. Scales are cycloid and rounded at the free end. There are some fine scales on the soft dorsal fin and the basal half of the caudal fin. The eyes are moderately wide with adipose lids.

The fish attains a size of 10—14".

*A kind of carp is called "Bhangan" in the E. Punjab.

(13) The "Indian Salmon" Group.

General characteristics.

Body oblong and compressed. Eyes lateral, are large and more or less covered with an adipose lid : mouth on the lower side of a prominent snout with a deep cleft on the sides. There are two dorsal fins. Lateral line continuous and continued on to the caudal fin. Air-bladder is often present.

A rough type of isinglass is obtained from the air-bladder.

Species of Commercial importance.

(*a*) Indian Salmon .. .. Polynemus tetradactylus.

(*b*) Mango fish .. .. Polynemus paradiseus.

(*a*) *Indian Salmon.*

Polynemus tetradactylus.

English	.. .. ..	The Indian Salmon.
Bengali	.. .. ..	Guchhia, Sahal.
Canarese	.. .. ..	Vameenu.
Malayalam	.. .. ..	Bameen.
Marathi	.. .. ..	Rawas, Chelachi.
Tamil	.. .. ..	Pozhakkala.
Telegu	.. .. ..	Maga.

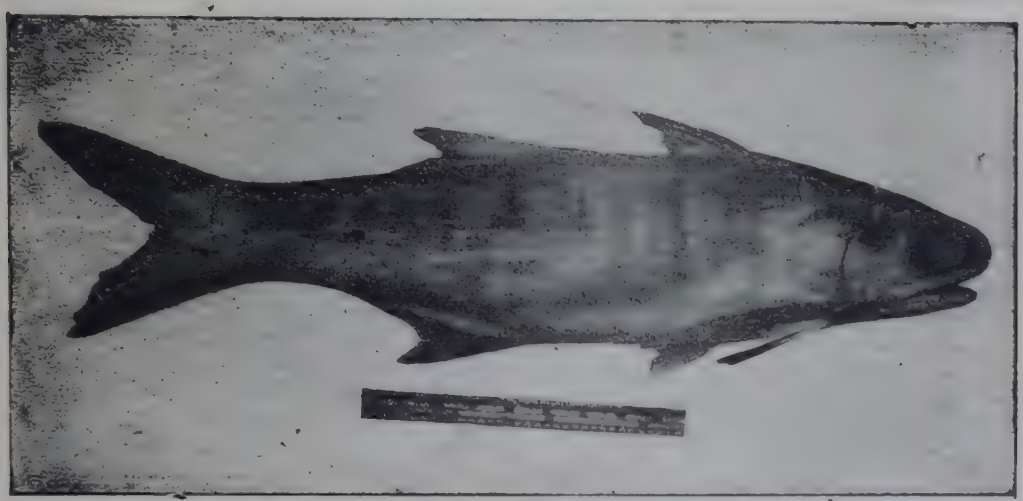
Description.

Colour.—Silvery green becoming yellowish white on the sides and abdomen. The dorsal and caudal fins have black edges and minute black points on them. The ventral and anal fins have a pale orange border. There is also a dark mark on the gill-cover.

Length of head 1/5 of the total length.

The fins are very well developed. The caudal fin is deeply forked. There is no air-bladder in this species. The scales are ctenoid, small and extended on to the vertical fins.

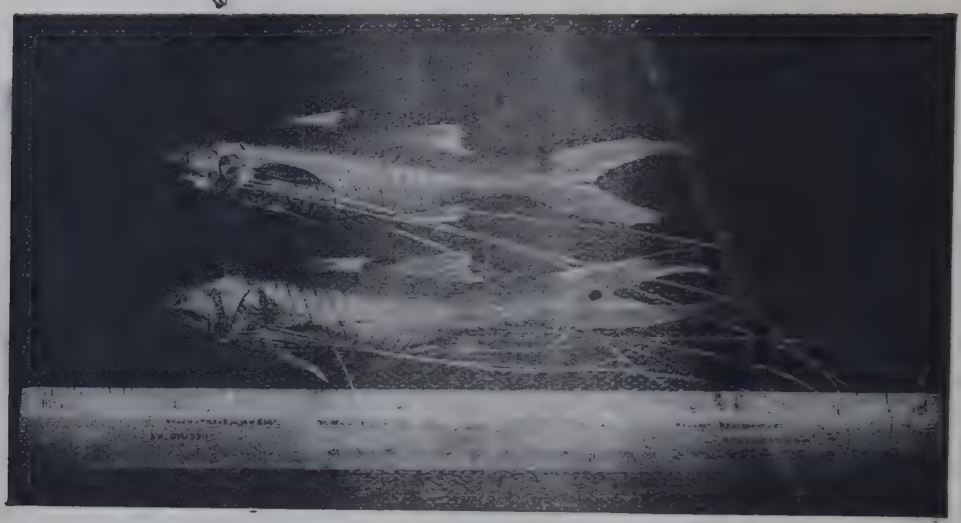
The fish grows to 6 feet and upwards in length and is caught in the sea. It is also known to ascend high up in the rivers, and is common in the Hooghly at Calcutta. The fish is excellent eating and salts well.



The Indian Salmon

Polynemus tetradactylus

(Length up to 6 feet)



THE MANGO FISH
Polynemus paradiseus

(Length up to 9 inches)

From a photograph of a model in the Indian Museum, Calcutta.

(*b*) *Mango fish.*

Polynemus paradiseus.

English	..	..	.. Tapsi or Mango fish.
Bengali	..	..	.. Tupsee machh.
Marathi	..	..	.. Dodywa rawas.

DESCRIPTION.

Colour.—Golden with a shade of grey along the back. The fins are also golden with a slight greyish stain.

Length of head = 1/6 of the total length.

The body is compressed and narrows down near the tail. The eyes are small. The rays of the pectoral fin are undivided ; the fin has, however, seven free rays below its base, the top three being the longest, strongest and about twice the length of the fish. (These should not be confused with the barbels). The caudal fin is deeply forked and the upper lobe is the longer of the two.

The fish attains about 9 inches in length and is considered a great luxury for the table. The fish is found in the " Indian seas. Bay of Bengal at least as low as Coconada..... entering rivers for spawning purposes, generally during the south-west monsoon and the cold months " (Day).

" Those who officiate in the temple of ' sib ' (Siva) are called ' Tapasi ' in the vulgar dailect and ' Tapasivi ' in Sanskrit, that is to say penitents. They ought not to shave, on which account a fish called Mango fish by the English of Calcutta, which has long fibres proceeding from near its head is called by the same name " (Hamilton-Buchanan).

(14) The "Jew fishes" (Sciaena spp.) Group.

General characteristics.

The body is oblong. Eyes are of moderate size. The snout is rounded and hangs over the upper jaw. There are two dorsal fins which are connected together. Scales are present on the head and snout and often also on the vertical fins including the tail. Air-bladder is present.

The counter part present in the Atlantic waters is called the "shadow fish" from its passing like a shadow through the water. "From it originated the myth of the songs of the sirens, for under water it bellows and buzzes, and purrs and whistles. It can be heard 20 fathoms down, and its whereabouts thereby known, so that it has been netted in shoals". (W. J. Gordon.)

Sciaena diacanthus is described below as typical of the several species found in the Indian seas. These fishes are eaten both fresh and salted and isinglass is made from the air-bladders.

Sciaena diacanthus.

English	Jew fish.
Bengali	Poa, Poma.
Canarese	Balde*.
Malayalam	Kora*.
Marathi	Ghol*.
Tamil	Kathalai*.
Telegu	Gorasolu, Gorakalu*.

Description.

The colour of the fish is brownish grey, shot with silver along the back. The head is glossed with purple. The fins are yellowish with black dots. The eyes are golden. The young ones may be differently coloured and may have vertical bands.

Length of head = 1/4 of the total length.

The snout is slightly inflated and has three pores across the base and three openings along the free edge of the skin. Similarly there are five pores under the lower jaw. The caudal fin is wedge-shaped. The scales are ctenoid except those on the snout and below the eyes.

The fish attains a growth of 5 feet in length, and is found in the seas of India. The fish is known to ascend tidal rivers.

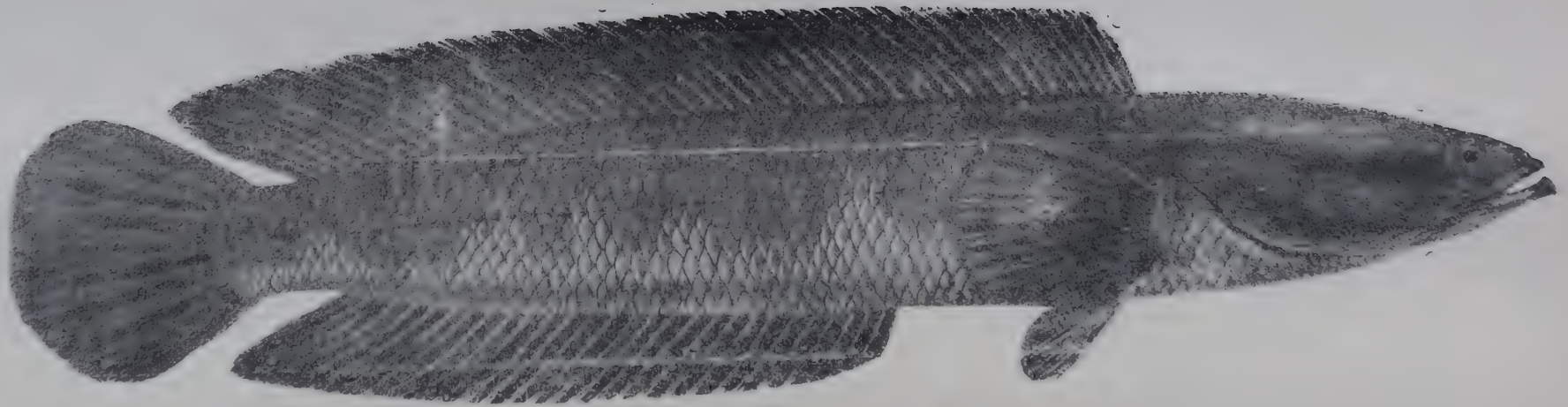
---

*General names: different prefixes are sometimes employed to denote the different species.

THE JEW FISH
Sciaena Sp.

(Length up to 5 feet)

"Fishes of India", Day.



THE MURRAL OR SNAKE-HEADED FISH

Ophiocephalus striatus

(Length up to 3 feet)

"Fishes of India", Day.

(15) The " Live fishes " (or air-breathing fishes) Group.

General characteristics.

These fishes have hollow cavities in their heads which act as a primitive lung. Owing to an amphibious mode of respiration, they are able to exist for lengthened periods out of water and can travel some distance over moist ground. They are able to live in the moist semi-dried mud of a tank during the dry season.

Species of Commercial Importance.

(*a*) The Murrals	Ophiocephalus striatus.
(*b*) The Climbing Perch ..	Anabas scandens.
(*c*) The Magur	Clarias magur.
(*d*) The Scorpion fish	Saccobranchus fossilis.

(*a*) *The Murra's.*

Ophiocephalus striatus.

English	The Snake-headed fish.
Assamese	Shaul, Gojhal.
Bengali	Shol.
Canarese	Koochina murl.
Hindi	Murral, Dheri murl, Sowra.
Malayalam	Wrahl.
Marathi	Dakhu.
Oriya	Sola.
Punjabi	Dhoalee, Carrodah.
Tamil	Verarlu, Currupu-veralu.
Telegu	Sowarah.

Description.

Colour.—Very dark brown along the back and on the sides upto the lateral line. Below this line the colour of the background is yellowish white with irregularly shaped brown or dark grey streaks extending from the sides to the abdomen. Some spots and bars can be seen at the posterior end of the dorsal fin. The pectoral fin is not spotted or straited. The young specimens are orange-red.

Length of head is about 1/4 and the tail fin 1/6 of the total length.

The body is sub-cylindrical tapering from the flattened snake-like head to the rounded caudal fin. On the summit of the head large and irregularly shaped scales are present. There is also a prominent lateral line present.

The fish can grow to about 3 feet in length. The bazaar specimens, however, are usually 15—24 inches.

The group murrals (*Ophiocephalidae*) are popularly called the snake headed fishes on account of the plate-like scales which cover the heads of these fishes. There are seven or eight species present in the fresh waters of the plains of which *Ophiocephalus striatus* is the most valuable food-fish. All the species are very much alike in shape and differ only in colour.

The fish are found in the fresh waters throughout the plains of India, especially in swamps and grassy tanks. " These fishes take a bait very readily, especially a frog and are said to rise to a salmon-fly " (Day).

(*b*) *The Climbing Perch.*

Anabas scandens.

English	.. .. ..	The climbing perch.
Assamese	.. .. ..	Kai, Khayi.
Bengali	.. .. ..	Coi, Corvu.
Hindi	.. .. ..	Kobhai.
Malayalam	.. .. ..	Undee-collee
Tamil	.. .. ..	Panieri-kendai, Sennal.

Description.

Colour.—Darkish-green becoming lighter on abdomen. During life there are usually four wide vertical body-bands and a dark stripe near the angle of the mouth. The young may have a black blotch on the side of the base of tail surrounded by a light yellow ring.

Length of head = 2/7 of the total length.

The body is oblong, laterally compressed with a wide head. A cavity above the gills contains the air-breathing apparatus which enables this fish to live for a long time out of water. The scales are large and regularly arranged. Scales are present on almost all fins.

This fish attains a length of about 8 inches and is said to travel some distance on land or even climb trees.

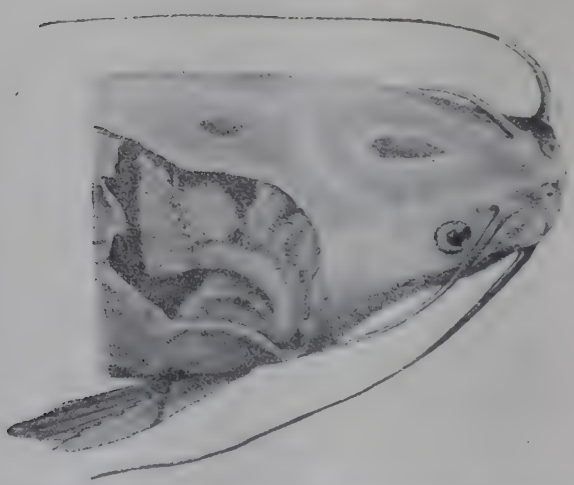
The Climbing Perch
Anabas scandens

(Length up to 8 inches)

"Fishes of India", Day.

Clarias magur

(Length up to 18 inches)



The respiratory device, for direct aerial respiration, present in *Clarias magur*

"Fishes of India", Day.

(c) *The Magur.*

Clarias Magur.

English	..	The Magur.
Bengali	..	Magur.
Hindi	..	Mangri.
Oriya	..	Magurah.
Punjabi	..	Kug-ga.
Telegu	..	Marpoo.
(Hyderabad)	..	Maroof.

DESCRIPTION.

The colour is either a uniform rich reddish brown or a uniform greyish black. Fish of both colours are found together. The shade becomes a bit light near the abdomen. There are one or more concentric arcs of a deeper shade on the caudal fin. The head is vertically compressed (*i.e.*, flattened) and the tail portion is latterly compressed.

Length of head to the end of the gill-cover is 1/5 and of the tail fin 1/8 of the total length.

There are four pairs of barbels, the longest pair reaching the base of the pectoral fins. The head of the fish is " shagreened " on the upper surface and is covered with fine granules. This fish has a characteristic many rayed dorsal fin. The pectoral spine is finely serrated but is covered with skin. The caudal fin is rounded.

Grows to about 18 inches in length. As food it is deemed highly nourishing. It is found usually at the muddy bottom in fresh and brackish waters.

(*d*) *The Scorpion Fish.*

Saccobranchus fossilis.

English	.. .. ..	The Scorpion fish.
Assamese	.. .. ..	Singi, Shini.
Bengali	.. .. ..	Singhi.
Hindi	.. .. ..	Singi.
Malayalam	.. .. ..	Kadu.
Marathi	.. .. ..	Bitchu-ka-machi.
Oriya	.. .. ..	Singee.
Punjabi	.. .. ..	Noor-i-e.
Tamil	.. .. ..	Teli.
Telegu	.. .. ..	Marpu.

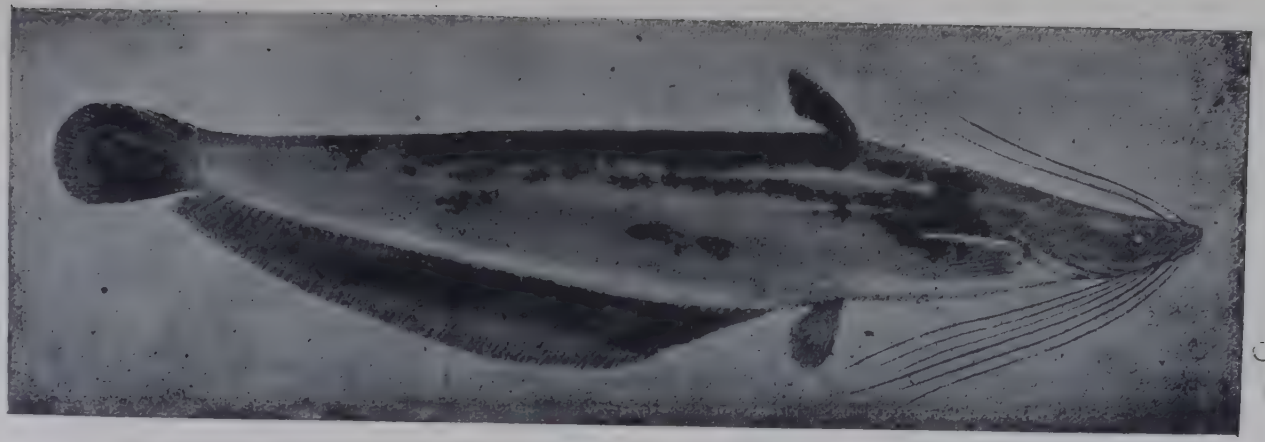
Description.

The colour is dark purplish-brown, almost black ; the young ones are reddish-brown.

Length of head is about 1/6 and that of the tail fin 1/9 of the total length.

The body tapers uniformly in the horizontal plane from the gills to the caudal fin. In the vertical plane the back is almost a straight line from snout to tail. The ventral outline is bowed and this effect is heightened by the shape of the long anal fin. There are four pairs of barbels of which the maxillary pair reaches almost the pectoral fins. The sharp serrated spines in the pectoral fins are reputed to be poisonous and are broken off by the fishermen. The caudal fin is rounded.

The fish grows to about a foot in length. It is found in the rivers and tanks all over India.



THE SCORPION FISH
Saccobranchus fossilis

(Length up to 1 foot)

"*Fishes of India*", *Day.*

(16) The Carps Group.

General characteristics.

The whole body, excepting the head, is covered with well-marked silvery or grey scales. Very often there are other colours also such as black, red, blue or a golden or coppery sheen. Carps have one dorsal fin and no adipose fin. Barbels are present in some varieties. The abdomen is usually rounded, but may come to a cutting edge, which, however, is never serrated as in the herrings. Other notable characteristics are the presence of open pores across the snout and the existence of a tubercle in the centre of the lower jaw.

The carps are the most important of the fresh-water fishes of India. Certain varieties are confined to the hills in the snow-fed streams, others flourish in sub-mountainous tracts, while there are many species which live in the fresh-water in the plains. Carps generally feed on aquatic vegetation and decaying organic matter. They grow to a marketable size rapidly. They are, therefore, well suited for stocking tanks and ponds. As the carps do not breed in confined waters, but deposit their spawn only in the flooded areas of rivers and streams, it is necessary to stock the ponds annually with the fry.

Species of Commercial Importance.

(*a*) Labeos	(*i*) Labeo rohita (*ii*) Labeo calbasu.
(*b*) Catla	Catla buchanani.
(*c*) Mrigala	Cirrhina mriga a.
(*d*) Barbus	Barbus tor.

(*a*) *Labeos.*

The general colour is leaden and the centre of each scale is paler than the margin. The lips and snout are fleshy, the lips being continuous round both jaws and the snout often covered with pores. *Labeo* species are found in tanks and rivers, where they are observed to be bottom feeders.

(i) *Labeo rohita.*

English	.. .. ..	Rohu.
Assamese	.. .. ..	Rohit, Rui.
Bengali	.. .. ..	Ruee.
Hindi	.. .. ..	Rohu.
Marathi	.. .. ..	Tambada-massa.
Oriya	.. .. ..	Ruhu.
Punjabi	.. .. ..	Pohu, Tapra, Dhambra.

DESCRIPTION.

Colour.—Bluish or brownish along the back becoming silvery along the sides and beneath. Sometimes there is a red mark on each scale. The fins are reddish, in some specimens black.

Length of head is 1/5 and of tail fin 1/9 of the total length.

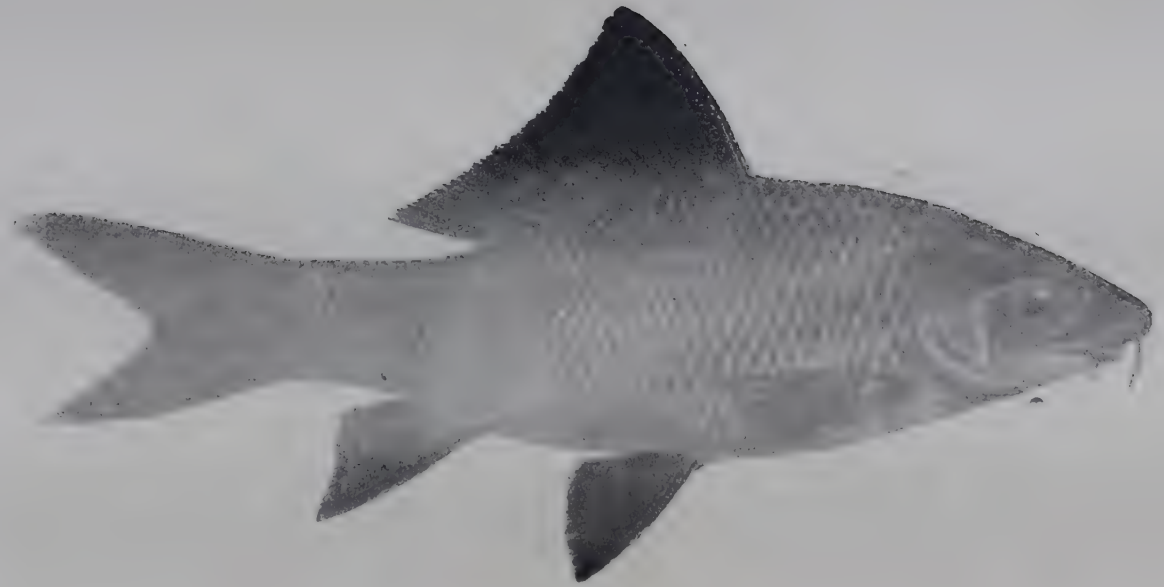
The rohu is a robust fish with an elongated body which narrows suddenly towards the tail. The snout is obtuse and projects slightly beyond the jaws, but there is no lateral fold. The lips are thick and fringed with a distinct inner fold above and below. There are 2 pairs of short thin barbels present. The caudal fin is deeply forked.

The rohu grows to three feet or more in length. It is much esteemed as food. It adapts itself readily to the still waters of a lake or tank. It is caught with a rod and line and it is said to provide good sport.

THE ROHU
Labeo rohita

(Length up to 3 feet or more)

"Fishes of India", Day.



THE KANOSHI
Labeo calbasu
(Length up to 3 feet)

"Fishes of India", Day.

(*ii*) *Labeo calbasu.*

English	.. .. ..	The Kanoshi.
Assamese	.. .. ..	Mahlee, Kaliara.
Bengali	.. .. ..	Kalabasu, Kunda.
Canarese	.. .. ..	Kuri-meenu.
Marathi	.. .. ..	Kanoshi.
Oriya	.. .. ..	Kala-beinse.
Punjabi	.. .. ..	Dhai, Kalahan, Di.
Telegu	.. .. ..	Nalla-gandu-meenu.
(Cutch)	.. .. ..	Dai.

DESCRIPTION.

Colour.—Dusky black. Many of the scales especially of those living in clear streams have a red centre. Fins are black, but occasionally the end of the upper lobe of the caudal fin is white.

Length of head is 1/6 to 1/5 and of tail fin 1/5 of the total length.

It is a deep, stockily built fish. The mouth is rather narrow with the snout depressed and having no lateral lobe. There are pores on the snout and the upper lip. Two pairs of barbels are present, the rostral pair being the longer. The caudal fin is deeply forked. This fish differs from the rohu in having a larger number of rays in the dorsal fin.

Labeo calbasu grows to 4 feet in length. It is found in deep pools in clear sluggish streams and is said to give good sport on rod and line.

(*b*) *Catla.*

Catla buchanani.

English	.. .. ..	The Catla.
Assamese	.. .. ..	Bau, Dhekera.
Bengali	.. .. ..	Catla.
Hindi	.. .. ..	Catla, Chepti, Boassa.
Oriya	.. .. ..	Barkur.
Punjabi	.. .. ..	Theila, Theil
Tamil	.. .. ..	Theppu-meenu.
Telegu	.. .. ..	Botchee.
(Cutch)	.. .. ..	Tambra.

DESCRIPTION.

Colour.—Dark grey along the back, silvery on the sides and white on the belly. The fins are dark-coloured, sometimes black. The scales with the exception of those on the belly, have a pink (or coppery) centre.

Length of head and tail fin, each about 1/4 of the total length.

The head is broad ; the mouth is wide with a prominent lower jaw. The body is deep and moderately compressed. The upper jaw has no lip. The lower lip is doubled outwards. The caudal fin is deeply forked. Barbels are not present.

The fish grows upto four feet in length (80 pounds in weight). It is much esteemed as food when not exceeding 2 feet. The larger ones are coarse.

The fish is largely employed sor stocking tanks.

THE CATLA
Catla buchanani
(Length up to 4 feet)

"Fishes of India", Day.

THE MRIGAL OR HAMILTON'S CARP
Cirrhina mrigala
(Length up to 3 feet)

"Fishes of India", Day.

(c) *Mrigala.*

Cirrhina mrigala.

English	..	Hamilton's Carp.
Assamese	..	Mirka, Mirga.
Bengali	..	Mrigala.
Hindi	..	Mrigala, Naini.
Marathi	..	Mirrgha.
Oriya	..	Mirrgali.
Punjabi	..	Mori, Morakha, Naraini.

DESCRIPTION.

Colour.—Silvery ; dark grey along the back, sometimes with a coppery tinge. Pectoral, ventral and anal fins are orange stained with black.

Lengths of head and tail fin each 1/5 of the total length.

Very much like rohu, but with a wider mouth and thin lips. The lower jaw has a small tubercle in the centre. There is a pair of small barbels present in fold of lip. Scales are large.

The fish grows upto 3 feet in length. It is found in the rivers and tanks in Bengal, Deccan, the United Provinces, Punjab and Cutch. It is an excellent species for stocking tanks and is highly esteemed as food.

(*d*) *Barbus.*

Barbus tor.

English	Mahaseer.
Assamese	Bura patra, Junga peetina.
Bengali	Putitor, Tor.
Canarese	Harale-minu.
Canarese (Mysore)	Hallaminu.
Hindi	Naharm.
Hindi (Bihar)	Kajra.
Malayalam	Meruval.
Marathi	Khadchi, Masta, Mahsala.
Marathi (Satara)	Kudis.
Marathi (Poona)	Kursi.
Punjabi	Mahasir, Bhor, Chaniaru, Chitratu, Ghaur.
Tulu	Heragalu, Peruval.
Tamil	Kendi, Bom-min.
Telegu	Pedha-polika.

Description.

Colour.—Day describes the colour as silvery or greenish on the back and top of head, becoming silvery shot with gold on the sides and beneath. The colouration of this fish varies in different localities and sometimes even in the same locality.

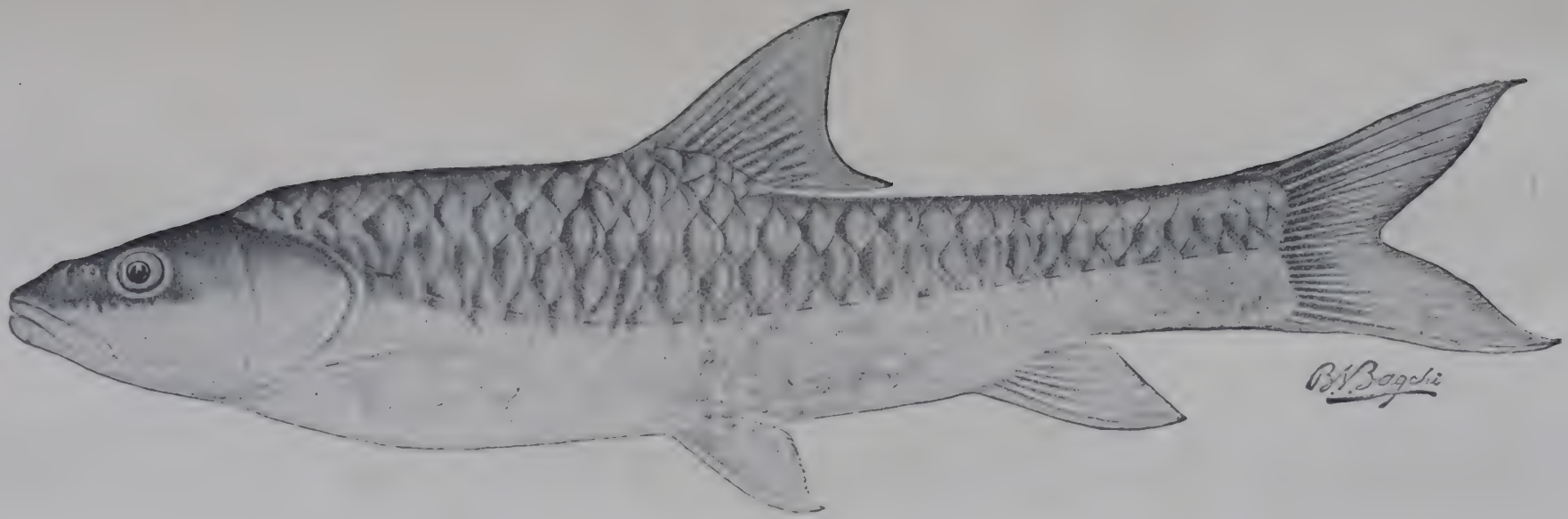
Length of head is 2/9 and of tail fin 1/5 of the total length. (The measurements are different in the young specimens).

It is an oblong, somewhat compressed, stream-lined, trout-like fish in which both the profiles are gently and gracefully arched. The head is broadly pointed in front. Behind the anal fin the tail becomes considerably narrow. The mouth is small. The lips are fleshy and continuous at the angles of the mouth. The condition of the lips varies greatly in individuals of different sizes. There are two pairs of barbels which are more or less of equal length. The body is covered with large scales.

The fish grows to 5 feet 6 inches in length and over 100 pounds in weight.

Day observes that the fish is found " generally throughout India but in the largest size and greatest abundance in mountain streams, or those which are rocky." Immature specimens upto a few inches in length are found in most clear gravelly streams.

The mahaseer is the premier sporting fish of India. The mahaseers appear to travel towards the head-waters of rivers at the beginning of rains, and travel down-stream towards the end.



THE MAHASEER

Barbus tor

(Length up to 5 feet 6 inches)

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XLI, facing p. 272

(17) The Crustaceans Group.

General Characteristics.

The majority of crustaceans are marine. The well-known types are the prawns, lobsters and crabs, constituting the higher members of the group *Crustacea*. All prawns, shrimps and lobsters are aquatic and most of our commercial species live in the sea or in the estuaries of our great rivers.

The crustaceans usually possess 20 segments and 19 pairs of appendages "The head and thorax, fused to form what is known as the *cephalothorax*, is encased in a calcareous shell—the *carapace*. The abdomen is visibly segmented, each segment being dorsally protected by a calcareous surface, like that of the cephalothorax. The appendages, the feelers, legs, swimmerets, etc., are modified to suit the various functions to which they are adapted. Respiration is carried on by the *branchia* or gills which are enclosed in the carapace. The sexes are separate. * * * * * * Prawns in egg are sometimes referred to as "berried" prawns. Between the egg stage and the adult there is frequently a striking, varied and interesting metamorphosis". (H. S. Rai).

Moulting.—All prawns and crabs have a hard shell on the outside which affords protection to the animal and supports the internal organs. The shell also supplies points of attachment for the muscles with which the animal moves. It plays, therefore, the part of a skeleton, but unlike ours, the exo-skeleton of the crustacean is outside body. As it does not increase in size after it has been formed and is inflexible, the animal has to cast its shell periodically as it grows. During moulting the shell splits and is cast away leaving the animal with only a thin flexible membrane. This, however, rapidly grows by absorption of water and gradually hardens by the deposition of lime salts. The process goes on over and over again. Some of these animals have the power of voluntarily throwing off their limbs and re-generating them later.

Crabs are also essentially aquatic animals; some have taken to land, but on account of the necessity of keeping their gill filaments moist, most of them have to live comparatively near water.

Practically all species of prawns and crabs are edible. "All shell-fish have the property of storing great quantities of glycogen or animal starch and of fat, which renders them in the highest degree nutritious and they are, moreover, rapid growing and prolific animals—capable of extensive fishing which could be greatly increased by judicious farming." (C. M. Yonge).

Species of Commercial Importance.

(*a*) Prawns (marine) .. ..
- (*i*) Penaeus carinatus.
- (*ii*) Penaeus indicus.
- (*iii*) Leander styliferus.
- (*iv*) Metapenaeus monoceros.

(*b*) Prawn (fresh-water) .. .. Palaemon carcinus.

(*c*) Lobsters	(*i*)	Panulirus ornatus.
	(*ii*)	Panulirus polyphagus.
(*d*) Crabs (marine)	(*i*)	Scylla serrata.
	(*ii*)	Neptunus pelagicus.
(*e*) Crabs (fresh-water)		Pratelphusa spinigera.

Crabs and prawns are generally of a very timid and retiring disposition, hiding themselves in holes and crevices of the surface on which they live. At the slightest approach of danger they hurry away to their burrows or lie quiescent on the substratum, where in the midst of weeds, etc., they generally escape notice.

(*a*) *Prawns* (*marine*).

(*i*) *Penaeus carinatus.*

Calcutta	Bagda chingri.
*Canarese	Segadi, Chotta or Etti.
*Malayalam	Chemmeen.
*Tamil	Yera.
*Telegu	Royyalu.

DESCRIPTION.

Colour.—Adults of the species are deeply pigmented with a tint varying from olive green to deep bluish grey, with dark transverse bars on the abdomen. In young specimens some 2-3 inches long the colour is pale grey with dark green mottling among which the transverse bars of the abdomen are only detected with difficulty.

Varies in size from 7-8 inches but large specimens of 10-12 inches are also obtained.

(*ii*) *Penaeus indicus.*

Bengali .. .. .. Chapda chingri.

The general colour is translucent whitish, with numerous small brownish, greyish, or greenish spots scattered over the carapace and abdomen. The rest of the body is usually scarlet.

Grows to 6-7 inches in length.

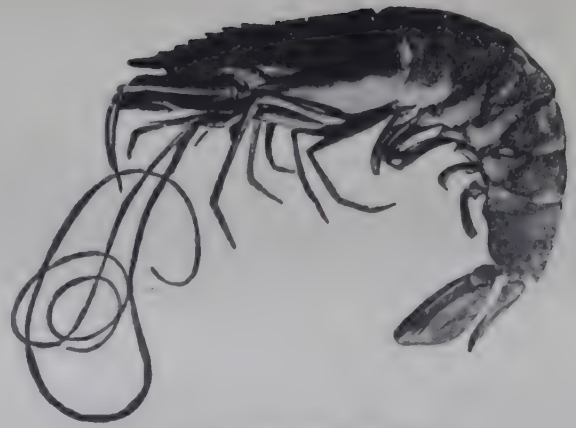
(*iii*) *Leander styliferus.*

Bengali .. .. .. Ghora chingri.

This species is small, about 2 inches in length. It is extremely common in the brackish water of the Sunderbans and the Gangetic delta.

* These vernacular names are applied to all species of prawns.

THE COMMON FOOD PRAWNS



Penaeus carinatus

Penaeus indicus

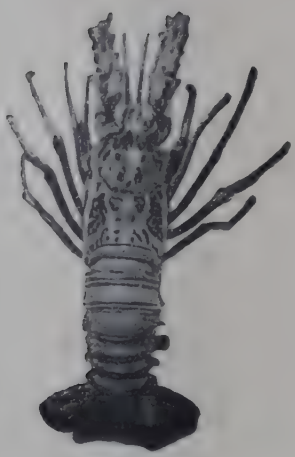
Metapenaeus Monoceros

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XLI, facing page 221.

A COMMON FRESH-WATER PRAWN.

Palaemon carcinus

(Length one foot or more)



THE ROCK LOBSTER

Panulirus ornatus

Reproduced from the Journ. Bombay Nat. Hist. Soc. VOL. XLI, facing pages 221 and 223.

(*iv*) *Metapenaeus monoceros.*

Bengali .. .. .. Koraney chingri.
Honye chingri.

This prawn is a very hardy creature and is able to live for a long time out of water. It is sometimes called a mad prawn probably owing to the fact that even long after capture it jumps about like a mad creature

It is found in large numbers in paddy fields etc. during and after rains and grows to 4 inches.

(*b*) *Prawn* (*fresh-water*).

Palaemon carcinus.

Bengali .. .. .. Golda chingri, Mocha chingri.

This is a fresh-water species which grows to a foot or more in length. In prawns which are found in the sea or in brackish water, (*Penaeids*), the first three walking legs end in claws and not in simple hooks. But in this animal the third leg does not end in a claw. This is a characteristic of true fresh-water prawns.

This species has accustomed itself to living in slightly brackish-water also and occurs extensively in rivers, canals, *bheels* and tanks.

Apparently prawns are migratory and their movements are associated with breed ng habits. Prawns are exceedingly common along the sea-coast. Though obtained in waters along sandy shores they appear to prefer waters with muddy bottoms where the fishermen seek for them. They generally creep along the bottom but are also equally adapted for swimming. Backward progression is also frequently resorted to.

(*c*) *Lobsters.*

(*i*) *Panulirus ornatus.*

This is popularly known as the spiny or rock lobster. It inhabits, preferably, the hard and rocky portions below the tidal waters, but is also found in deep waters. Its average length is about 10 inches ; weight 1½ lb.

(*ii*) *Panulirus polyphagus.*

This is larger than *Panulirus ornatus* and is found in deep water. It is beautiful purple in colour with darker purple and white bands.

Lobsters are generally caught from November to March. A "Lobster pot" is very often used. It is a box-shaped device with top and bottom of wood and the sides of netting with a couple of funnel-shaped entrances. The lobster gets in but it cannot get out.

Lobsters fetch a high price in some markets, but in many places, on account of their spiny shells they do not find favour with certa n sections of the population.

(*d*) *Crabs.*

Crabs belong to another sub-order of the *Crustacea* " in which the abdomen is greatly reduced and permanently flexed under the cephalothorax. In common with the other members of the crustacea the entire exo-skeleton is cast periodically. During the time of moult, the crabs secrete themselves until the fresh carapace has hardened. After every moult there is a decided increase in size ". (H. S. Rai). In swimming crabs the last leg is in the form of a paddle.

Crabs appear to breed during the monsoon months.

Crabs are in good demand in large towns. " Crab curry " is supposed to be good for asthma.

(*i*) *Scylla serrata* (*marine*).

Bengali	..	..	.. Nona kankra.
*Marathi	..	..	.. Khekra.
* Canarese	..	..	.. Aedi.
*Malayalam and Tamil	..	..	.. Nandu.

This is the common edible crab of India and is brought into the markets in great numbers. It is abundant in estuaries, back-waters, and mangrove swamps and is able to live also in fresh-water. Besides swimming about in the water it also lives in the edge in deep burrows below the water level. The usual size is 8 inches broad by 6 inches long.

(*ii*) *Neptunus pelagicus* (*marine*).

This is another swimming crab which is eaten in considerable quantities in areas near the coast. It lives mostly in the sea or in brackish waters. It appears to grow to at least 6 inches in size.

(*e*) *Crabs* (*fresh-water*).

Paratelphusa spinigera.

Bengali	..	..	.. Pati kankara.

This is the commonest fresh-water crab of Bengal and is found near tanks, *bheels* and rivers. Two other species of this genus are common in Madras and Bombay Provinces. Pati kankara of Bengal grows to 3 inches across the carapace. The Bombay species is bigger, growing sometimes to 5 inches.

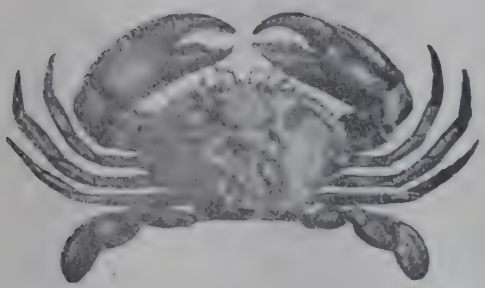
(*f*) *Special note on the fishing methods for crustaceans.*

(*i*) *Prawns.*

Parur Taluk in United State of Travancore and Cochin.—Paddy fields closely adjoin the backwaters and are on a higher level. After harvest in September, for a period of two months, water from the backwaters is allowed to get in and out of the fields freely. The fields are then rich in organic matter (hay etc.) and also in inorganic substances brought down by the rains. When the water level begins to recede, the bunds surrounding the fields are strengthened and the communication between the backwater and the fields restricted to a few sluice

* The vernacular names are applied to all species of crabs.

The Food Crabs of India.

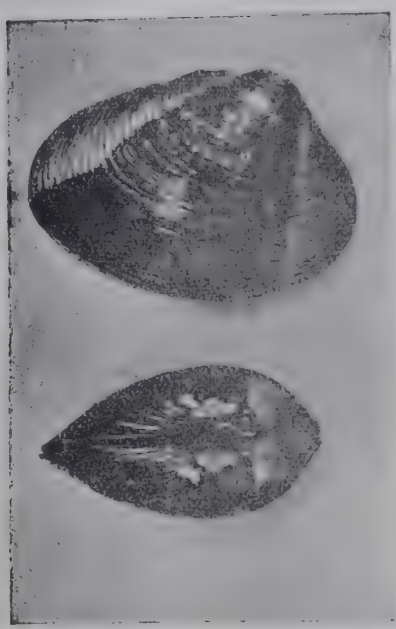


Scylla serrata

Neptunus pelagicus

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XII, facing p. 221.

The Clams



Tapes

Meretrix

Reproduced from the Journ. Bombay Nat. Hist. Soc., Vol. XXXV, facing page 830.

gates—generally one for each field. The gates are guarded by an elaborate wooden framework and by manipulating a series of adjustable planks the water level in the field can be regulated. The sluice-gates are kept open during the high tide when brackish water gets into the paddy fields, bringing in a large number of young prawns which abound in the backwaters at this time. The gates are closed at the onset of the low tide. This goes on for a month whereby the number of young prawns in the field increases. Periodically the gates are opened at low tide to change the water in the fields, but on such occasions the gate is guarded by a special contrivance to prevent young prawns from escaping. Fishing commences after 2-3 months, generally at the end of December or beginning of the January. A large conical net is fitted to the outside of the sluice-gate. When the gate is opened the paddy fields being on a higher level, water forces its way outside. The prawns are retained in the conical net and are periodically removed. Fishing is done at night and starts at the commencement of the flow-tide and hence the time changes with the phases of the moon. A powerful light is often placed in the sluice-gate to lure the prawns to the net (N. K. Panniker).

Chilka lake.—Prawns are nocturnal in habit and are accustomed to walk at night in the very shallow water along the edge of the lake. When they come to any obstacle *e.g.*, a fence, they try to make their way round it. A trap has been devised by the Oriya fisherman which depends for its success on these habits. From the shore into the lake a bamboo fence, 50 feet in length, is built and round its farther or lake end, in about 3 feet of water, traps are arranged in a circular on oval pattern leaving a small gap on one side close to the bamboo fence. Each trap is a rectangular basket-work of bamboo 4 feet in length. On one face there are three or four apertures protected from within by converging strips of bamboo, that render it very difficult for a prawn that has once entered the trap to escape. When the prawns walking about on the shore encounter one of these fences, they are easily led into the enclosures, where with the approach of day light they take refuge in the traps.

(ii) Crabs.

A line is stretched across a suitable creek, one end fastened to a pole fixed in one of the banks, and the other end carried in a boat, which is rowed to the opposite bank. The line is weighted with pieces of bricks and in between the bricks, pieces of dead fish are suspended as bait. Crabs attracted by the bait, cling to the line with their powerful claws. When the men tending the line feel that it has become heavy with the weight of crabs, they pull it in, with the crabs hanging on to the bait. The crabs are foolishly tenacious.

Crabs are also hooked and pulled out of their burrows with blunt iron hooks.

(18) Minor Shell-fisheries (Clams and Oyster) Group.

(*a*) *Clams.*

Clams are abundant during the monsoon when fish is scarce and are largely used by the poorer people along the coast. The clams are cheap and tasty. The important commercial species are (*i*) *Tapes* (*ii*) *Meretrix.*

(*i*) *Tapes.*—This is a brackish-water species thriving on stretches of clean sand. The animals may also be found in places where the sand is mixed with mud. But too much of fine mud, or high temperature are injurious.

(*ii*) *Meretrix.*—Habitat same as for *Tapes.* The flesh is finer and the shell thick and massive. The usual size is 2½ to 3 inches and the weight is about 4 oz.

The breeding season for clams lasts from March to June.

The clams are generally marketed alive. They are also sold with the shell removed. The shells are broken against a stone, the meat extracted with a push of the thumb and dropped into an earthenware pot containing fresh-water. Clam meat absorbs water and increases by about 1/3 its original size.

(*b*) *Clam fishing.*

The fishing is done generally at low tide and largely by women. Two methods are in vogue, dry digging and wet digging. When water has receded "dry digging" is practised. An iron prong attached to a wooden handle is used. Wet digging is employed when the beds are covered with water even at low-tide. A small boat and a "clam rake-net" are required and the fishing is in water 4-5 feet deep. The boat is anchored at the beds. The men wade into the water and locate and dislodge the clams by groping with their feet. The rake-net is then worked into the sand and mud and drawn up with the catch. The clams are washed repeatedly to get rid of the sand and mud. The rake consists of a semi-circular wooden frame of diameter 1½ feet and a net with a mesh of ½ inch is attached round the rim. A long bamboo fixed across the rim serves as a handle. In deeper waters, clams are fished by diving.

The clam meat can be preserved. Clams are boiled for about 20 minutes when the shells begin to gape. The meat is then shaken out and dried. The stew in which clams are boiled is used in making curry. The boiled meat does not smell and is eaten when dry.

Clam shells are used for lime-burning.

(*c*) *Oysters.*

Oysters are generally considered delicious. They contain glycogen, fats, vitamins and iodine and are very easily digested. Oysters are not popular among the better class Indians.

Species of Commercial Importance.

(*i*) *Ostrea gryphoides.*

(*ii*) *Ostrea cucullata.*

(*iii*) *Ostrea discoidea.*

(*i*) *Ostrea gryphoides.*—It is found usually in muddy creeks, where it is restricted to the low-tide area. It is sometimes found also in deep waters. This is a large oyster growing to about 6-7 inches. This is considered valuable because it grows to a large size very quickly (3-4 years) and can be easily cultivated.

(*ii*) *Ostrea cucullata.*—This is a rock-oyster generally found in clusters on rocks exposed at half-tides. It is small and seldom exceeds three inches in length. It has a very delicate flavour and is highly esteemed.

(*iii*) *Ostrea discoidea.*—This is a large flat oyster almost round in shape. The external surface is laminated. It is a more deep water form and grows to 6 inches in length. Its shell is generally encrusted with algae.

(*d*) *Oyster fishing.*

Oysters are fished from November to March. During this season they are white and plump and are in a good marketable condition.

Oyster farms are exposed at full low-tide. The beds lying below the low-tide mark are collected by diving. The shells are removed from the beds with a blunt iron instrument.

After collecting, the shells are opened and the meat scooped out. Oyster meat is stored in sea-water in an earthen pot.

Oyster shells when burnt yield an excellent quality of lime.

C.—PRESERVATION AND CURING OF FISH.

All processes which inhibit or wholly arrest *post-mortem* changes in animal products, *e.g.*, refrigeration, desiccation, pickling, smoking, the use of antiseptics, canning, etc., can and are utilised for the preservation of fish in India.

(1) Refrigeration.

The method of treatment differs according as whether the fish are to be preserved for one or two days only or for several days. In the former case merely packing the fish with crushed ice in a dealwood box would suffice. Saw dust or rice husk is sprinkled over to prevent a too rapid melting of the ice. This method is widely adopted for sending prime varieties of fish to inland consuming markets. Fish intended for long storage have to be *quickly* frozen in special air-cooled chambers or with chilled brine and stored at a low temperature. Plants for the freezing and cold storage of fish are now being erected in different parts of the country.

(2) Canning.

At present there is practically no fish canning in India. The industry is beset with several difficulties the chief one being the uncertainty of supplies of suitable varieties of fish at any of the centres, even for a specified and limited season. This difficulty can perhaps be overcome if a " mobile cannery " is employed to visit areas where fish are shoaling.

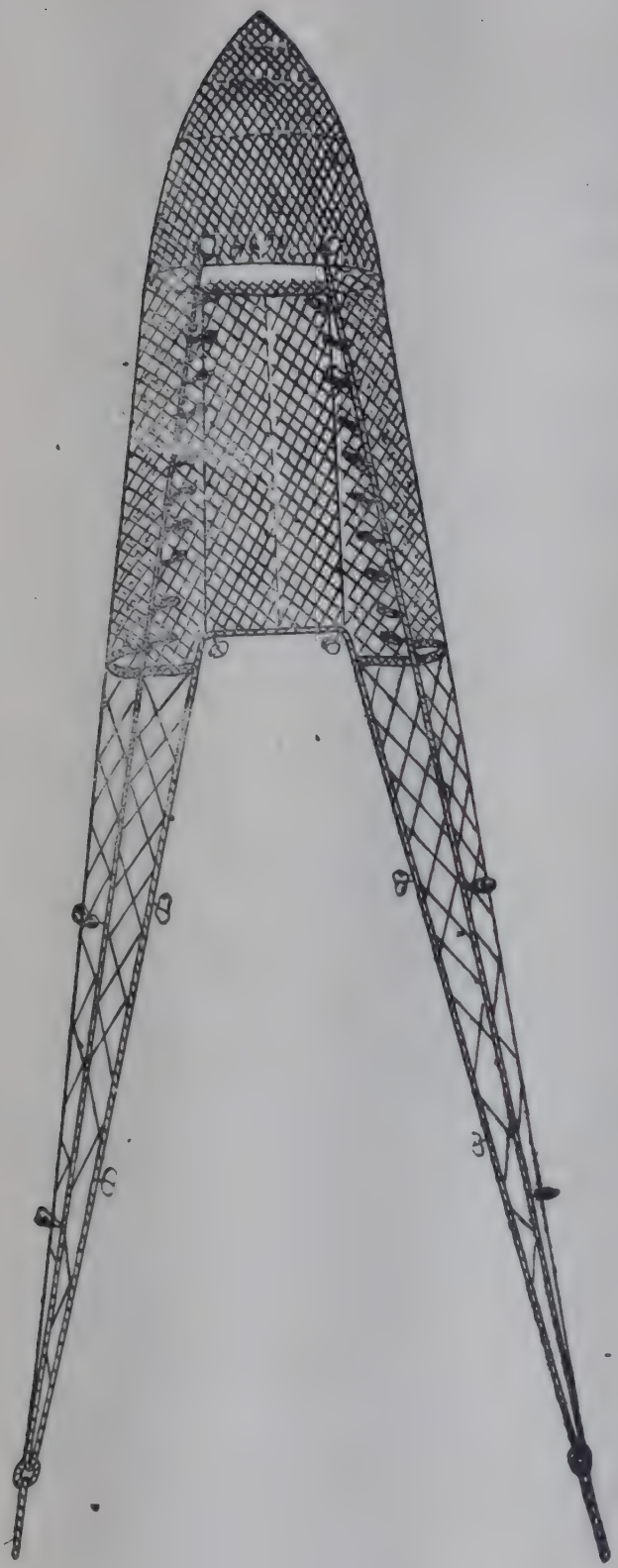
(3) Curing.

The chief methods of curing fish in India are sun-drying without salt, salt-curing by the dry process and salt-curing by the wet process. The object of curing is to withdraw natural moisture from the tissue cells of the fish to prevent bacterial action or enzymic decomposition. To obtain a wholesome cure the drying process should be rapid and thorough. This can be achieved by (*a*) heat, (*b*) dry air, (*c*) salt and (*d*) salt and pressure.

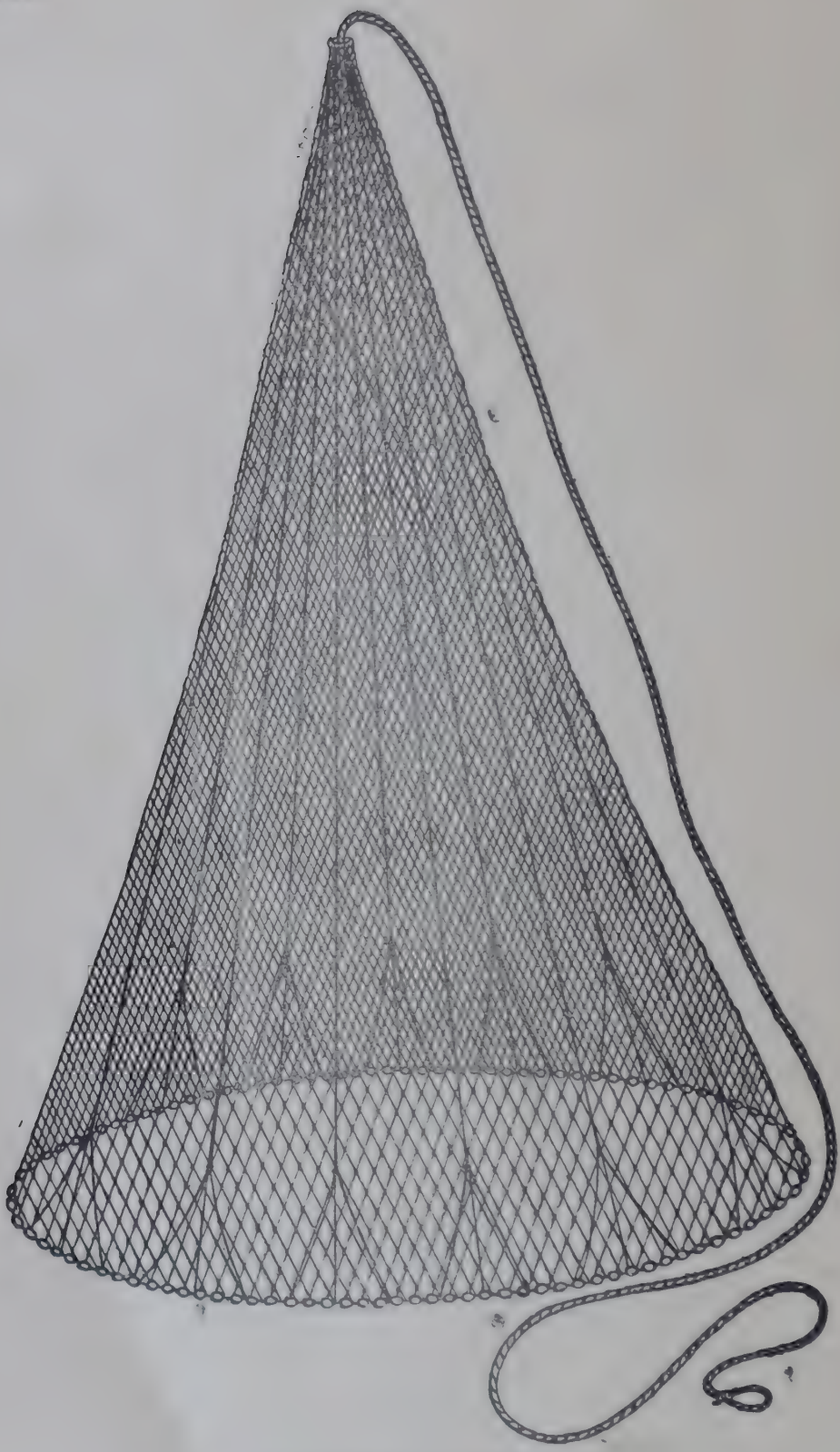
Drying is preferred to salting by the fishermen in India. As salt is expensive, wet-salting is rarely practised. When salt is used, it is applied only sparingly, putrefaction being prevented by the subsequent heavy drying.

In actual practice the type of cure depends upon the kind of fish to be cured, climate, materials available for curing, the length of time for which the fish are to be kept and finally on the requirements of the intended market.

(*a*) *Sun-drying.*—Drying in the sun or in the shade is the simplest method of curing fish and theoretically also the best, because the nutriments are not withdrawn from the cells and wasted as in salting. But a good cure is impossible on the tropical sea coasts because the air, though hot, is very moist and while the exterior of a thick tissue is toasted into a hardened surface, when exposed to the sun, the inside remains moist and warm. In dry regions like the interior of Bengal and Assam, sun-drying is relatively more successful especially when the operations are carried out during the winter months.



A BOAT-SEINE, VAKKU VALA, USED IN THE MALABAR COAST.



A "STRINGED" CAST NET

64B

Small or thin fishes such as Bombay Duck, ribbon fish, prawns, silver bellies, etc., are dried in the sun all along the coasts, chiefly where fish curing yards are not easily accessible or when the fish are caught very much in excess of the local demand. The catch is simply spread on the beach in a thin layer on a coir mat, *cadjan* leaves or bamboo *thatties* to prevent admixture with sand and dried for a day or two. Periodically the fish are turned over and before nightfall removed and heaped up in a closed enclosure. Sun-dried fish always contain 5-6 per cent. sand as impurity. In the absence of sun-shine the fish especially the oily varieties, putrefy and may have to be disposed of as manure. A few special products like shark-fins, fish-maws and " trepang " (beach-de-mer) as well as prawns and shrimps are always dried without salt. In Saurashtra all varieties except jew-fishes are sun-dried. In Bengal, the sea and estuarine fishes are cured by simple sun-drying on the foreshore of the Bay of Bengal. In Assam, " *Sutki* " the common sun-dried fish is prepared mainly from fresh water Carps such as *Labeos*, Catla, etc. After gutting the fish are laid flat side by side on mats made of *nal-reeds* and exposed to the sun. Sometimes there are bamboo platforms 3-4 feet high to spread the fish on. The drying process is continuous and extends for a week or 10 days depending upon the sun-shine and the fish are not removed at night.

In other provinces, fishermen are reported to dry small quantities of fish which they are unable to sell or consume themselves, but the quantities produced are negligible.

(*b*) *Curing with salt.*—There are two methods in vogue known as (*a*) the Common Cure or Dry Cure and (*b*) the Ratnagiri or the Wet Cure. In addition, small varieties which are intended for quick consumption are sometimes " light-cured " in certain Coastal areas. This process consists in lightly salting the gutted and cleaned fish by keeping them for a few hours in saturated brine and completing the cure by washing and drying in the sun.

(*i*) *Common Cure or the Dry Cure.*—Large fish such as seer, pomfrets, cat-fishes, jew-fish, perches, etc., are split along the dorsal line from the root of the tail to the tip of the snout and the guts and gills are removed. In this position, the vertebral column remains attached to one side of the fish. The vertebral column is severed from the fleshy side for the greater part of the depth of the fish but is not cut and removed. This operation gives the fish a wide flat shape. Scores are then made on the thick fleshy parts by passing the knife lengthwise. After washing, the fish are ready for the application of salt. In the case of thinner fish such as ribbon-fish, mackerels, small pomfrets etc., only the first dorsal cut is made. Mackerels are sometimes slit in the abdomen. Sardines are cured either by cutting off the head and the abdomen with a single diagonal cut or by simply slitting and removing the guts and gills. Large sharks are cut into convenient sizes. All cut up fish are usually washed in sea-water before salting.

The proportion of salt used varies in the different provinces. In Bombay it is one part of salt to every five parts of fish irrespective of the variety or the season of the year. In Madras, Cochin, Travancore and Orissa the proportion of salt is fixed in relation to thickness of the fish and the weather conditions.

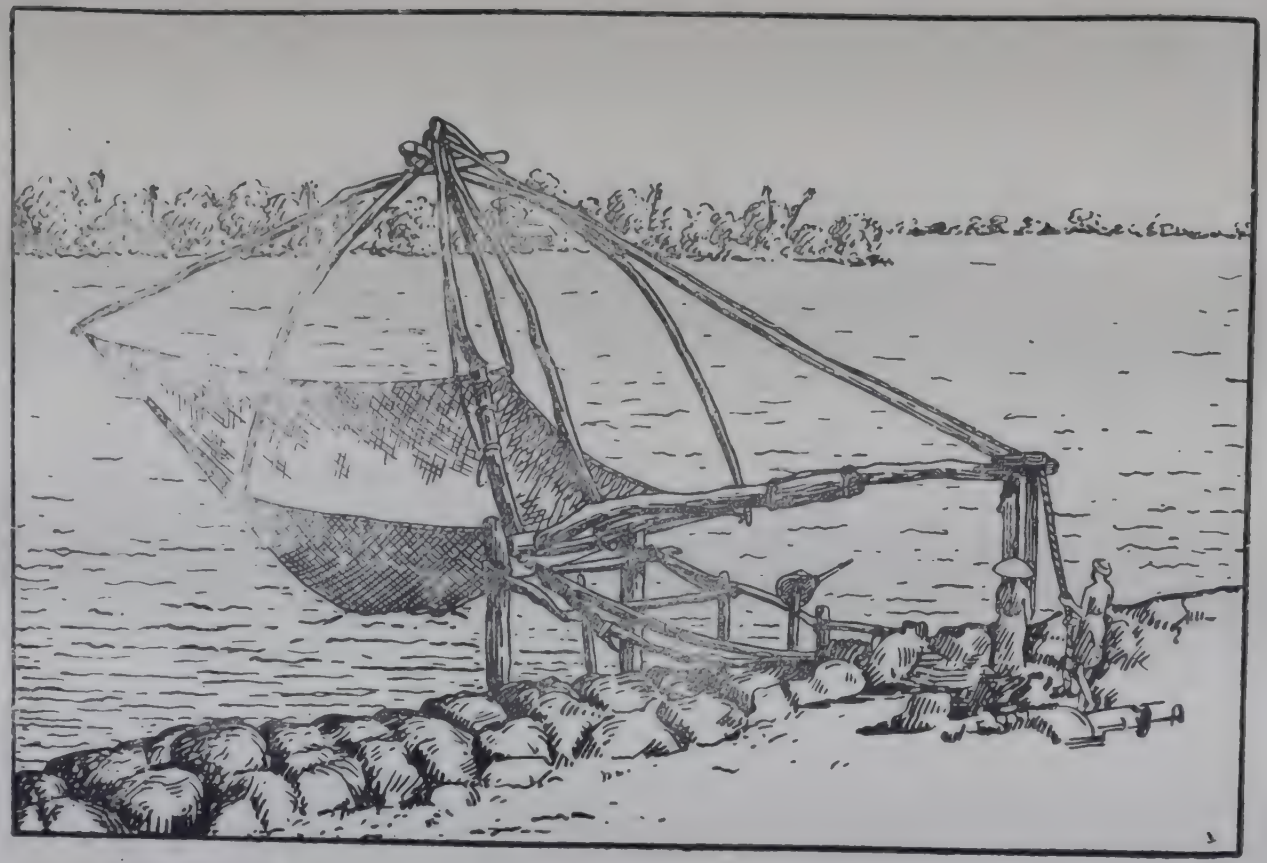
The salt is applied to the scores and rubbed all over the cut surface. The fish are then arranged in salting receptacles such as half-barrels, tubs, small dug-out *canoes* or cemented tanks. Generally the fish are kept in salt for 12-18 hours. They are then taken out, washed in the " self-brine " found in the salting tubs and put out in the sun on coir-mats or *Cadjan* leaves spread on the sand. A second washing in seawater after salting improves the appearance and colour of the fish but this is rarely done. It takes at least 2 days to dry the fish. Small fish dry better than larger varieties.

(*ii*) *Wet-salting or the " Ratnagiri " method of curing.*—As the name indicates, this is the cure adopted in the Konkan District of Bombay Province. Large fish such as seer, black pomfrets, sharks, Indian Salmon, etc., are generally treated. The fish are split, gutted and cleaned as for dry salting. One pound of salt is required for every three pounds of fish : half the quantity of salt is rubbed on the cut-surface of the fish on the first day which are then stacked on the floor of the curing shed to a height of 3 to 4 feet. On the second day half the remaining salt is rubbed in and the fish so re-stacked that the top fish become the bottom ones ; on the third day the remaining salt is applied and the fish re-stacked again. They are allowed to remain in this condition for another eight days and then removed ; they are not sun-dried afterwards. The finished product is very moist and yields to the light pressure of a finger. Curers from Goa, Ratnagiri, Viziadrug and other places in the Bombay province resort to certain Madras yards situated in South Canara district to cure fish by this method.

(*c*) *Smoking.*—Smoking is almost as universal as salt curing in every country except India. The process consists in placing the cleaned fish for a short time in brine or salt and suspending them on rods in a kiln in which a smoky fire of wood, saw-dust, rice-husk, etc., is burning. Smoking may be cool or hot, heavy or light, long or short according to the type of product desired. Light hot smoking for a short period is given when the article is intended for quick consumption.

(*d*) *Other methods.*—(*i*) *Pickling with salt and tamarind.*—Mostly mackerels are cured in this manner and the entire quantity produced is exported to Colombo. After gutting and washing, salt with a small piece of Malabar tamarind (called *Goruka puli* in Malayalam) is thrust into the abdomen of the fish. They are afterwards arranged in layers in a barrel with a sprinkling of salt and tamarind between the layers. Heavy weights are placed on the top of the pile and the barrel is temporarily closed. At the end of 3 or 4 days the " self-brine " is run off through a small hole made in the bottom. The fish are found to have shrunk considerably. They are pressed down and the barrel is filled with more fish from other barrels to make good the shrinkage. When completely filled in this manner, the cover is put back on the barrel and the original pickle (brine) returned till the barrel is completely full. The proportion of salt is 30 lb. per maund of fish. This type of cure is conducted only in a few yards on the West coast of the Madras province.

(*e*) *Prawn-curing.*—Prawns are cured by boiling and then drying or by simple sun-drying. The former method is resorted to chiefly during the wet weather. The Crustaceans are boiled with water in wide mouthed copper vessels till they become reddish-brown. After drying in the sun, the shells are



CHINESE BALANCED DIP NET USED IN THE COCHIN BACK-WATERS.

KATTA VALAI, A HIGHLY SPECIALISED FORM OF STATIONARY NET, USED IN THE COROMANDEL BACK-WATERS.

removed by putting them in jute sacks and beating the sacks hard against a block of wood. The kernels are sorted out and once again dried before storage. The shells are in demand as manure. In the second process, fresh prawns are simply sun-dried and the shells are not removed at all. In Orissa, prawns are preserved by spreading them on *thatties* over a quick but smoky fire. A new process for curing and storing prawns is being popularised by the Madras Fisheries Department. Here, prawns are first dipped in boiling water or 6 per cent. salt solution and then shelled. The shelled prawns are salted by immersion in saturated brine for about 20 minutes. After draining off the brine, the kernels are dried either in the open air or in a drier. The drying is only partial and is stopped when the prawns are so firm that fairly strong pressure between the thumb and the finger leaves an impression on them. The product is packed in carbon-di-oxide in sealed tins.

(*iii*) *Fish-pastes.*—Tamarind fish paste is prepared in Malabar from sea fishes. The fish are cut into slices and salted. When dry, the slices are treated with a pungent and spicy paste consisting of chillies, mustard, garlic, tamarind, etc., prepared in vinegar. A paste called *hidal khunda* is made by Nowgong fishermen from certain varieties of small fish. These are placed in a hole dug in the ground and kept covered for nearly a month. The mass is then dried in the sun, powdered and packed in bamboo tubes. Sometimes, a little ground pepper and some alkaline ash (called " khar " in Assam) is mixed with the paste at this stage. In Assam a favourite fish paste called *Shidal sukti* is made from dried fish. These are allowed to soak for a few hours in water and then packed closely in *matkas*, the interior of which has been well smeared with fish oil. Fish oil is also sprinkled between the layers. The jar is sealed and buried in the ground for several months to allow the fish to develop the characteristic 'taste".

D.—MANUFACTURE OF FISH OILS, GUANO, FISH-MEAL ETC.

Oils derived fish are "body" oils from varieties such as sardines, mackerels, cat fishes, etc., which are used in industries and " medicinal " liver oils particularly from cartilaginous fishes used for therapeutic purposes.

" *Fish* " *oil and Guano*—the product obtained by drying the cooked fish after oil has been expressed—is prepared only on the West coast of the Madras province (Malabar and South Canara districts) where shoals of oil sardines appear, usually in great abundance, from August to June. The fish are boiled with a sufficiency of water in large cauldrons, oil if any that separates is skimmed off and the cooked fish is put into coir-mat bags and pressed in country screw presses. The pressed mass is then dried in the sun. This constitutes the *guano* of commerce. When " guano " with no admixed sand, is powdered and sieved, fish meal is obtained.

" Medicinal " oil is usually prepared from the livers of sharks, saw-fishes, skates and rays. The livers are bled and washed with water. Thereafter they are cut into small pieces and boiled with a sufficient quantity of water in earthenware or tinned metal vessels. The oil which separates is skimmed off. It is washed repeatedly with hot water and filtered through cloth. " Medicinal " liver oils after testing for Vitamin A potency are usually blended with groundnut oil so as to yield a product containing 1500 International Units of Vitamin A per gram.

E. MANUFACTURE OF SHARK FINS & ISINGLASS (FISH-MAWS.)

(1) Shark fins.

The fins of large sharks (excepting the caudal) are cut near their roots washed in sea-water, dusted with a mixture of hot wood ashes and slaked lime and dried in the sun or smoked according to the prevailing weather conditions. The cured product which is crisp and brittle, is exported to China and other countries in the Far East. The soup prepared from the cartilaginous rays in fins is considered to be a delicacy by the Chinese.

(2) Isinglass (fish-maws.)

Isinglass is obtained from the air-vessels of several species of marine estuarine and fresh-water fishes. The term was originally applied to the stuff obtained from the air-vessels of the Russian fish sturgeon.

In India, the best air-vessels are those obtained from perches and the Indian salmon. An inferior quality is obtained from jew-fishes and certain varieties of cat-fishes. The superior quality of isinglass is tongue-shaped, whereas those from cat-fishes are rounded bags with an open mouth. After they have been removed from the fish the air-bladders are slit open, washed in sea-water and sun-dried. No efforts are made to refine the product for the export markets.

Isinglass is used in the clarification of wine and beer. It is also used as a substitute for gelatine in confectionery, for the preparation of special cements and as a constituent for a special water-proofing composition.

F. —FISHING VESSELS.

To suit local requirements several distinct types of fishing vessels have been evolved in this country. The factors which have influenced their design are the physical characteristics of the coast line or the nature of the (inland) water, the types of fish available and the habits of such fish and the proximity of any harbour of refuge to which the fishing boat may rush for shelter in a storm.

(1) Sea Crafts.

(*a*) West coast.

(*i*) *Dug-out Canoes.*—The Canoe is made by scooping out material from a large trunk of *aini** or *cheeni** wood. The keel portion is left thicker than the sides. They are of two sizes and employed for different purposes. The larger ones which run to 32-35 feet in length by 3 feet wide and $2\frac{1}{2}$ feet deep and of three to five tons burden, are usually used in pairs, chiefly for working the bag nets. The smaller ones averaging two tons displacement (24 feet $\times$ 3 feet $\times$ $1\frac{1}{2}$ feet) are used by drift or cast net fishermen. The larger boats usually carry a crew of seven, the smaller three or four. The bigger canoes have a bamboo mast 15 feet high and a simple sail while the smaller ones have two masts and a large canvas sail. The average life of a dug-out canoe is estimated to be fifty years.

(*ii*) *Boats.*—The largest of the fishing boats, called *machwas*, are used by Ratnagiri fishermen for deep-sea fishing. They are between five and ten tons displacement, measuring $30 \times 9\frac{1}{2} \times 3\frac{1}{2}$ feet and are of good sea going capacity

* These are Malayalam names :—*Aini-Artocarpus hirsuta*, Lam, and *cheeni—Tetrameles mudiflora*, R.Br.

CATAMARAN LOGS.

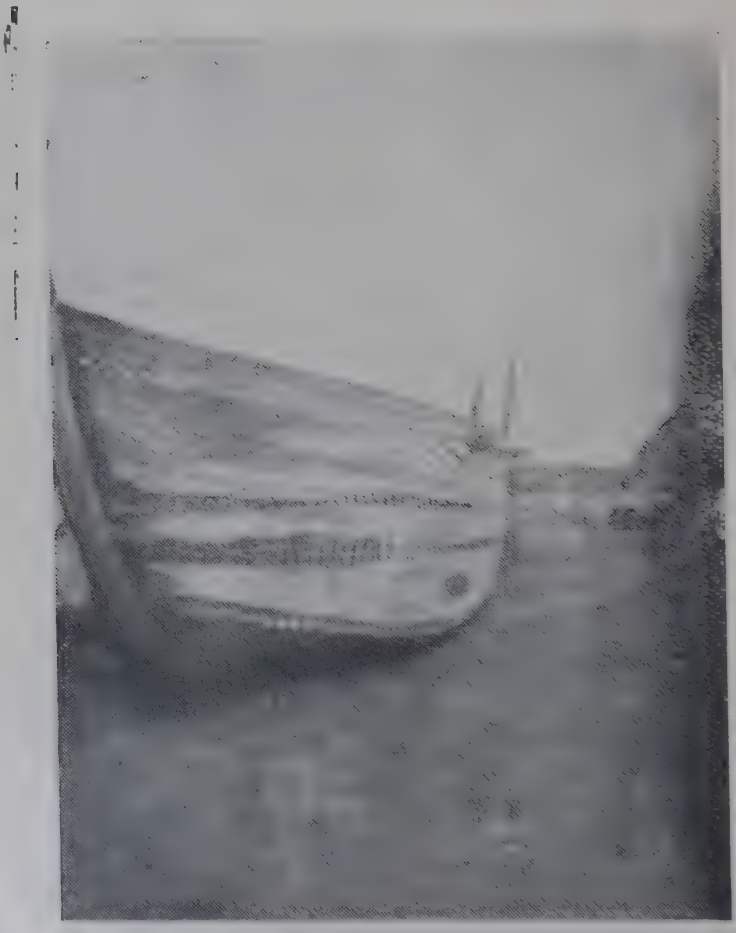
PLATE 58

RATNAGIRI SHARK-DRIFTER.

PLATE 59

OUT-RIGGER CANOE USED FOR FISHING WITH THE RAMPANI NET.

PLATE 60



MASULA BOAT USED FOR IN SHORE FISHING ON THE MADRAS EAST COAST.

DUG-OUT CANOE.

BOATS USED FOR THE TRANSPORT OF DRIED FISH IN ASSAM.

PLATE 63

FISH CARRIER, *Chhip* FOR TRANSPORT OF FISH IN BENGAL.

PLATE 64

A MOTOR BOAT USED FOR TRANSPORTING FISH FROM COASTAL FISHING VILLAGES TO BOMBAY.

By Courtesy of the Director of Fisheries, Bombay.

and sailing power. They are generally built of teak frame and planking with subsidiary upper strakes of mango wood. They carry a single mast and a great press of sail. They are low free-board boats, low in waist, without deck or separate accommodation for nets. They are mostly used for deep-sea fishing with big-meshed drift nets. Smaller boats used by drift-net fishermen are constructed on the same model.

To shoot the long-haul shore seine—the Rampani net used in the Konkan and Canara districts—a special type of boat is used. It is called *Akada hodi* in Konkan and *Padavu* in Malabar. In size, these boats range between 16 and 20 feet in length.

The boats described above as well as the canoes operating in the southern districts of the Bombay Province have out-rigger equipments. The out-rigger is formed by two curved bamboo poles (*bowker*) and a float (*uldi*). The poles are laid across the waist of the boat and extend five to six feet on one side of the boat. They are so tied that the distance between the poles decreases towards the distal ends. To these is directly attached the light wooden float made generally of *Erythrina indica*.

(*b*) East coast.

(*i*) *Catamarans.*—The characteristic sea fishing craft of the East coast is the Catamaran*. It is a keel-less raft formed by lashing together three to five pieces occasionally seven pieces of light rough-hewn wood. The logs are from 12-15 feet in length. These rafts use a bamboo mast and a simple canvas sail.

(*ii*) *Boats.*—The only boats in use are the non-rigid *masula* boats, which are constructed with planks without frames or ribs so as to withstand the severe knocking from the surf. Some of them are quite large, ranging from 26-35 feet in length, 5 to 8 feet in breadth and 3½ feet in depth and accommodate a crew of 20. The usual size, however, is 15×3 feet intended for a crew of 2.

(*iii*) *Boat-catamaran.*—The "boat catamaran" is a large catamaran composed of 3 logs semi-permanently secured together with cross pieces at either end in such a way that the side logs rise higher than the upper surface of the central one. Thus a longitudinal hollow is formed similar to the cavity in the boats. This craft is seen only between Punnaikayal and the Cape-Comorin.

(2) River Crafts.

(*a*) *Rafts and dug-outs.*—There is wide diversity in the materials utilised in the construction of rafts and dug-outs. Inflated skins, plantain stems and bundles of *shola* sticks tied together and forming crazy platforms, and inverted earthenware pots laced together in a bamboo frame-work are the types commonly met with. Craft of inflated skins are generally found in the upper reaches of the larger rivers. The skins used are generally of buffalo turned inside out. Rafts of plantain stems or *shola* bundles are generally found in the marshy districts of the low lands or for fishing in tanks, *jhils* and other quiet waters *e.g.*, in Bengal and the Tanjore District in South India. The "*chatty*" or earthen pot raft is seen in Patna, Gaya, the Hazaribagh. It is constructed usually of 9 earthen pots arranged in rows of three. Connecting bamboos lashed on either

* Derived from *Kattu maram*; in Tamil, *Kattu* means lashing and *maram*, timber.

side of the mouths of these pots support a light platform of bamboo, the mouth of each pot being closed with a cover of *sal* leaves. An identical *chatty* raft is in use in South India in the districts of Trichinopoly and Tanjore. Single pots are also used, the person sitting astride in the pot. The circular and bigger coracle is much in use in South India in the Cauvery and the Tungabhadra. The usual type is a shallow cylindrical frame of wicker work about five feet in diameter over one mouth and the sides of which a cow hide is stretched and firmly tied. Very similar to the coracle is the *tigarni* or *gamla* used in Bengal. Dug-out canoes called *donga* in Bengal and *ekhta* in Bihar are also very common on the shallow tributaries of the Ganga and other rivers. These are made from the lower ends of the stem of the palmyra palm.

(*b*) *Plank-built boats.*– There are various types of these boats. Certain types exclusively used for fishing are described below.

Small riverine crafts are called *dinghis*. Those used for fishing are known widely as *jalia dinghis* to distinguish them from small boats used for trnasporting goods or passengers. The commonest *jalia dinghi* is the one employed in the *hilsa* fishery in conjunction with the clap net called *sangla*. It is from 15 to 25 feet in length and from 3 to 4 feet in width. The *jalia dinghi* used with the triangular dip net called *bhesal jal* is also very similar.

When rapid transport is needed, *e.g.*, to take the produce of the large fisheries of the Sundarbans to the centres of demand, a narrow boat propelled by numerous rowers is used. The fish carrying *chhip* is a typical example.

(*c*) *Large fishing boats.*– Of these, the *chhandi* is a good example. It is used in drift-net fishing in the lower and wider reaches of the deltaic area in rivers. It seldom carries a sail, being propelled by two or more rowers in the bows. The largest size is 60 feet in length and 10 feet in width. Medium sized boats are more common and these have the following dimensions, length 34 to 36 feet, beam 5 to 5½ feet and depth about 2 feet. The *chhandi* is partially decked, a few feet at each end being closed in with planking. The rest of the boat is covered with a temporary decking of split bamboo readily removable. Another type of large fishing boat is the *bachari* used for fishing with a big cast net of the same name. It is longer but narrower than the *chhandi* boat. Another interesting boat is the *mechho bachari* used for the transport of "live" fish from the *bil* districts of Bengal to Calcutta. These boats are from 30 to 50 feet in length and the greater part of the hold is partitioned off to form a live well in which fish are transported in water.

G.– THE FISHING AREAS OF THE INDIAN UNION.

The fishing areas of the Indian Union can be broadly divided into the following sections:—

(1) Marine fisheries.

(*a*) *Gujarat area.*–The Gulf of Cambay (including the south coast of Kathiawar) and down the coast of Gujarat to tne Kolak river.

(*b*) *Konkan area.*–From Kalai on the southern frontier of Daman to the mouth of Terekhol creek (*i.e.*, up to the northern boundary of Goa).

(*c*) *North-Canara area.*– From Majali on the southern boundary of Goa to Bhatkal, near the southernmost coastal limit of the Bombay province.

(*d*) *South-Canara area.*–From the southern boundary of the Bombay province down to the mouth of Balipatam river, near Cannanore.

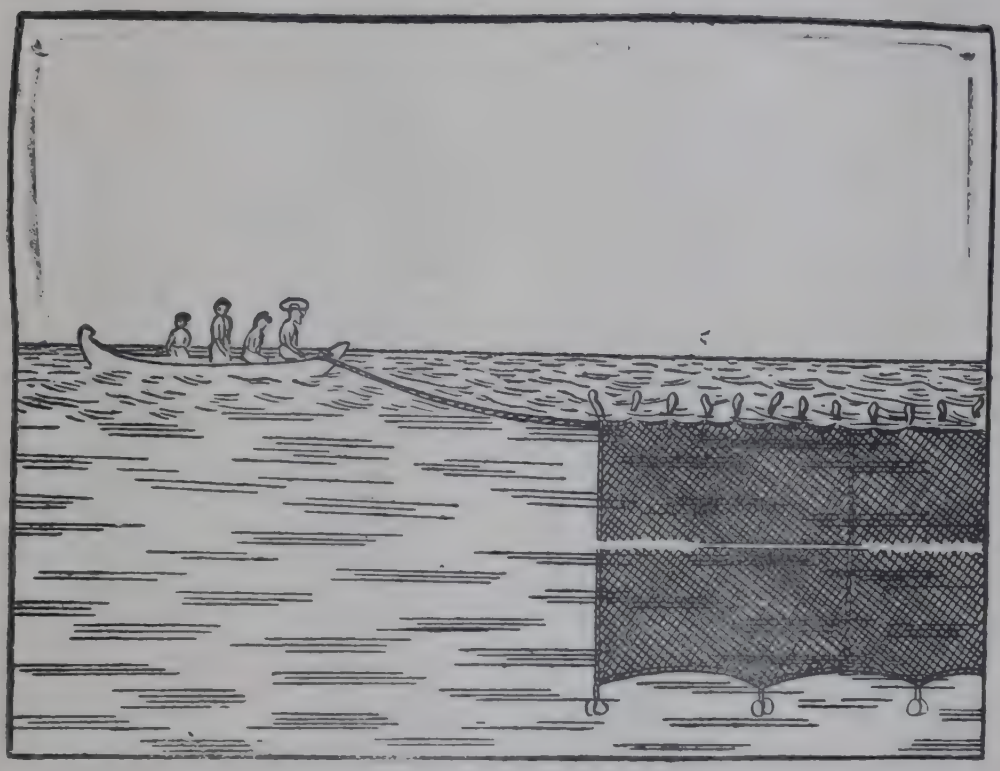
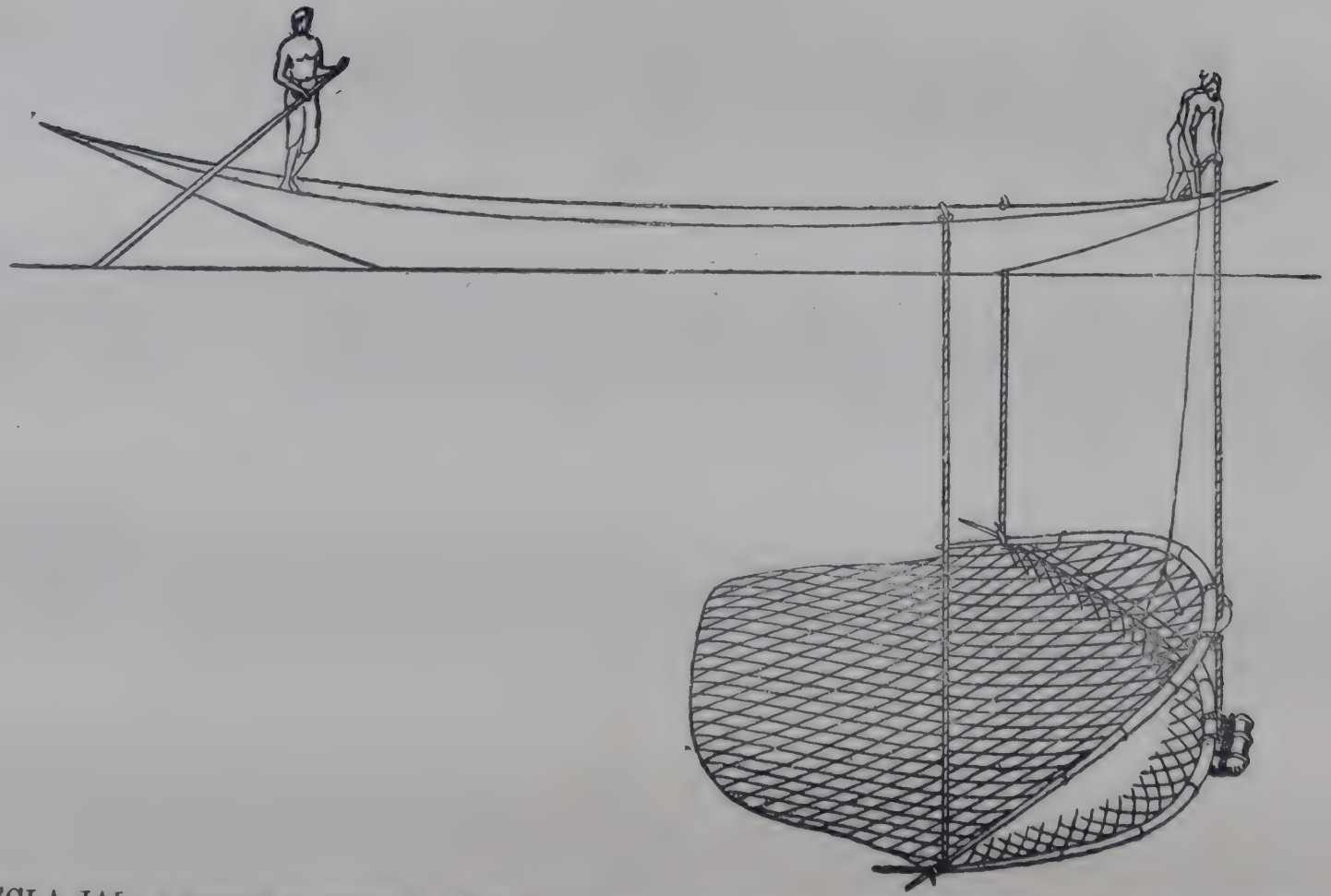


PLATE SHOWING THE MODE OF OPERATION OF A DRIFT OR GILLING NET.



SHANGLA JAL, A HINGED PURSE-SHAPED NET USED TO CATCH HILSA ASCENDING FRESH-WATER RIVERS IN BENGAL.

(*e*) (*i*) *Malabar coast area.*—From Cannanore in the north to Cape Comorin the southernmost point of India.

(*ii*) *Malabar and south Canara areas.*—Back-water fisheries.

(*f*) *The gulf of Mannar area.*—From Cape Comorin to Point Calimere consisting of the gulf of Mannar and the Palk Strait Bay.

(*g*) (*i*) *The Coromandel coast area.*—From Point Calimere along the east Madras coast to the Pulicat lake (a point about 100 miles to the north of Madras).

(*ii*) *The Coromandel coast area.*—Back-water fisheries.

(*h*) *The Telegu area.*—From Pulicat Lake northwards to Puri in Orissa, including the Chilka Lake.

(*i*) *The Deltaic area.*—The estuaries of the Mahanadi, the Ganga, and the Brahmaputra, stretching from Puri to Sunderbans in West Bengal.

(2) Riverine and lacustrine fisheries.

(*a*) The Ganga system of rivers.

(*b*) The Indus system of rivers.

The fishing implements used in the above areas have been classified and the vernacular names, dimensions and brief descriptions of their mode of operation, etc., are described in the pages that follow. Sketches of some typical fishing nets are given in plates 53 to 56 and 65-66.

H.—MANUFACTURE OF NETS AND OTHER TACKLE.

Light nets are made of ordinary cotton thread available in the bazaar. These are spun into thicker threads of 3, 4, 5 and 6 strands by means of the *chadu* or *takli*, the common spinning instrument. The stronger but coarser nets are generally prepared with sann hemp fibre (*Crotalaria juncea*).

The nets are frequently "barked". The usual tanning materials employed are *kalisam* or *odyan maram* (*Odina wodier*), *Panachika*, (fruit of *Diospyros embryopteris*), or the bark of karel wood which is imported from Zanzibar. The bark (or the dried fruit) is finely ground and the tannin extracted by boiling it with water. When the resultant decoction is cool, the net is soaked in it for some time; after it has been dried on a scaffold, it is run through the decoction a second time. Damaged sections of nets are replaced when necessary by new ones; it often happens that a net exists for an "indefinite" period, although all its original sections may have long since been replaced.

Long lines used in sea fishing are always made of cotton. These are tanned periodically. Indigenous hooks are employed with these lines. The hand-lines used in angling are made of sann hemp, or of black fibre from old leaf-stalks of the palmyra and *kitul* palm (*Caryota urens*) trees. In Bengal, waste silk is often used. Despite the care taken by fishermen, the average life of a light cotton net is rather limited being only one fishing season of nine months. Nets covered with blood, slime and fish oil, when stored wet, easily lose strength due to bacterial action as well as through heating on account of the oxidation of oils. The life of these nets could be considerably enhanced by sprinkling salt over them before they are piled, as is done in the U.S.A. Blue vitriol (Copper Sulphate) alone or combined with soap and creosote is also largely used in other countries, so that nets might retain their elasticity as well as lightness. Recently Copper oleate has been recommended by the U.S. Bureau of Fisheries as a highly efficient net preservative.

(a) Fishing gear used in the Gujarat and down the coast of Gujarat

Type of Fishing implement.	Vernacular name.	Dimensions.		Size of mesh.	Material.
		Length.	Breadth or depth.		
I. Fixed or stationary nets.	(*i*) Jadi jal ..	42′ ..	6′ ..	2½″ ..	Cotton ..
	(*ii*) Magh ..	15′ ..	5′ ..	..	Cotton ..
II. Bag nets ..	(*i*) Gholwa ..	56′ ..	17′ ..	At mouth 1¼″; gradually decreasing to ¼″ at lower end.	Cotton ..
	(*ii*) Dol ..	100—150′	Diameter at mouth 15—20′	Varies between 1″ to ½″.	Cotton ..
III. Seine nets	(*i*) Jal ..	77′ ..	7′ ..	..	Hemp
	(*ii*) Taresar ..	20′ ..	4′ ..	1″ square	..
	(*iii*) Faroda or Achhoda.	100′ ..	3′ ..	½—¼″ ..	..
IV. Drift nets	(*i*) Jal ..	77′ ..	7′ ..	..	Hemp ..
	(*ii*) Kendari ..	100′ ..	3′ ..	1″ ..	Cotton ..
V. Inshore drag net.	Bandh net ..	20′ ..	4′ ..	1″ square	..

area (the gulf of Cambay, including the south coast of Kathiawar, to the Kolak river).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
25—30	..	When in use 5—6 pieces are linked together and fixed to stakes.	Mullets ..	Used during monsoon months.
3	..	40 pieces joined together and tied to stakes.	Mullets and cat-fishes.	
50—80	..	Purse-shaped net with a circumference of 56′ at the mouth. The net is kept stationary.	Bombay Duck, cat-fishes.	The bark of the Babul tree is used for tanning the cotton nets.
125	..	Bagnet of conical shape which is kept stationary.	Do. ..	
10	..	12 pieces joined together while operating.	Miscellaneous catch.	
10	..	Several pieces linked together. This is an inshore-net kept in position by lead weights attached to the lower edge and wooden floats to the upper edge.	Miscellaneous catch consisting of mullets, sardine, etc.	
10	..	Three pieces usually linked together.	Mullets ..	
10	One boat and 4 men.	12 pieces linked together. The net is kept stretched at about 2 feet below the surface of water and allowed to drift with the current.	Pomfret, seer, etc.	
20	One boat and 3 men.	This is a typical gill net. Operated in the same manner as "Jal".	Do. ..	
5 per piece	..	One end of a fleet is held in a boat. The other end is moved so that a semi-circular enclosure is formed. The net is then dragged towards the shore.	Small miscellaneous varieties.	Is used for fishing in the estuaries.

* Pre-war costs.

(a) Fishing gear used in the Gujarat and down the coast of Gujarat

Type of fishing implement.	Vernacular name.	Dimensions.		Size of mesh.	Material.
		Length.	Breadth or depth.		
VI. Cast nets	(*i*) Mang ..	35′ .. (Rectangular.)	7′ ..	½″ ..	Cotton twine ..
	(*ii*) Chogia ..	25′ .. (Conical net.)	10′ ..	½″ ..	Cotton ..
VII. Long lines	60—100 hooks suspended from a horizontal line 130 ft. long. Weights are employed to adjust the depth. The line is of twsited cotton.				
VIII. Hooks and lines	Not much in use.	Fishermen capture mullets and cat-fishes with cotton			

area (the Gulf of Cambay, including the south coast of Kathiawar, to the Kolak river)—concld.

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs. 20	..	6—9 pieces linked together. The extremity is fringed with lead weights. It is thrown by hand and forms a semi-circular enclosure. This is different from other types of casting nets because it has not got the radial cords.	Small miscellaneous varieties.	
15—20	..	Similar to other casting nets	Prawns, sardine, mackerel, etc.	
..	..	The depth is usually about 30 feet. The length of hooks varies from 1—2″. All marine varieties are caught.		
lines and 2″ hooks mainly for their own consumption, Bait .			prawns.	

* Pre-war costs.

(b) Fishing gear used in the Konkan to the mouth of Terekhol creek,

Type of fishing implement.	Vernacular name.	Dimensions			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Fixed or stationary nets.	(*i*) Waghur or Budichi.	24′ ..	18′ ..	5″ ..	Stout twine ..
	(*ii*) Asu ..	3—4′ ..	1½′ ..	½″ ..	Thin cotton thread.
	(*iii*) Kavi ..	..	..	..	.. ..
II. Bag nets ..	(*i*) Gholwa ..	2—4′ ..	1—3′ ..	½—1″	Cotton ..
	(*ii*) Bhoksi jal ..	60—72′ ..	45′ at mouth and 1½′ at the tail end.	¼″ ..	Cotton ..
	(*iii*) Dol ..	140—150′	100′ at mouth and 3′ at tail end.	Mesh varies from 5 to ½″.	Hemp or cotton
	(*iv*) Jot .. (a bag-net with two long wings).	60′ long ..	Very broad near the mouth.	Varies from 1½ to ½″.	The bag made of hemp : the wings of coir-rope (mesh 7—12″ square).
III. Seine net	(*i*) Tirgan ..				
	(*ii*) Raosi ..	80′ ..	40′ .. (Rectangular.)	12—15″	Hemp ¼″ thick
	(*iii*) Adit ..				
	(*iv*) Dhangda ..	100′ ..	35′ .. (Rectangu ar.)	3″ .. square.	Hemp ..

area (from Kalai on the southern frontier of Daman i.e., up to the northern boundary of Goa).

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
200—600	..	20—30 pieces linked together and stretched like a screen. The net is kept in position by means of heavy weights attached to the lower edge and with wooden floats to the upper.	All kinds of sea-fishes.	Main deep sea net of Ratnagiri.
5	..	Used for inshore fishing ..	Mud-fishes ..	Ain or chilheri bark used for tanning.
..	..	Used in creeks and shallow waters, tied to stakes.		
15—20	..	Used in creeks and shallow-waters:—	Small prawns.	
50—100	..	This is a V shaped stake net used near the shore.	Small fishes, mud fishes and prawns.	
200—250	..	A V shaped net used for deep sea fishing in 8—14 fathoms of water.	Small prawns. Bombay duck, rays, black pomfret.	This net when used for inshore fishing is called by the name Dolgada.
100	..	The lower portion known as *Fada* carries lead weights and the top, light floats. Used in 2—3 fathoms of water. After setting the net the men shout and endeavour to drive the fish into the bag.	Cat-fishes and Indian salmon.	This net has been introduced into this area by Madras fishermen.
25	..	About 20 pieces joined together when in use. The bottom edge is weighted. To the top dried pumpkins or pieces of wood are attached. The net is kept vertically suspended in the water.	Saw-fish, promfrets, rays, sharks, etc.	The dimensions are varied slightly to suit the capture of any one type of fish, he net would then be called by the name of the fish which it is intended to catch, *e.g.*, wagli jal " ray net ".
500	..	Similar to above. Spread in 5—10 fathoms of water. In shape it is like a safety pin with the two ends curved to entangle the fish.	Seer and Indian salmon.	A net used only in Malvan and Vengurla.

Pre war costs.

(*b*) *Fishing gear used in the Konkan to the mouth of Terekhol creek,*

Type of fishing implement.	Vernacular name.	Dimensions.		Size of mesh.	Material.
		Length.	Breadth or depth.		
IV. Drift nets	(*i*) Vavdi or Wavri	100—240′	10—15′	3—4″ square.	Hemp ..
	(*ii*) Bhishi (= Nihi in Malvan).	100′ ..	3½′ ..	¾″ square	Hemp ..
V. Inshore drag nets.	Rampan ..	36′ ..	20′ high (Each piece.)	¾—1″ ..	Hemp ..
VI. Cast net ..	Pag ..	12′ Circumference at mouth 82′. (a circular net).		½ to ¾″	Cotton ..
VII. Long lines	..	Length of line=400—600′			Cotton ..
		Length of hooks=2″			Cotton ..

area (from Kalai on the southern frontier of Daman i.e., up to the northern boundary of Goa)—concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs. About 10	1 boat and 3 men.	Several pieces are laced together. The lower edge is weighted and the upper edge is kept afloat with wooden floats. Used at a distance of 5—10 miles from the shore. The net is fixed to the boat with a long rope and the boat and the net are allowed to drift with the current.	Sword-fish, cat-fishes, Jew fish, etc.	
25	1 boat and 3 men.	Similar to above but is used only on dark nights.	Flying fish ..	
About 2,000	80 men and one or two boats.	About 100 pieces are linked together. The net is provided with 6″ coir ropes, 1,200—1,500 feet long, at both ends. Floats and sinkers are attached to the top and bottom edges and their effects nicely balanced so that when the net is spread into the sea it stands erect like a wall. The rope at one end is held by a party of 40 men in the shore. The net is then loaded into a boat and taken to the sea. The boat takes a semi-circular course, dropping the net as it proceeds and enclosing a shoal of sardine or mackerel. The other end of the net is brought ashore to a point ½ of a mile distant from the first and the hauling rope handed over to another party of 40 men. The net is then steadily pulled towards the shore.	Sardine, mackerels, horse-mackerels, silver-bellies and all kinds of shoaling fishes which approach the shore.	Sometimes 10 tons of sardines or mackerels are landed in one Rampan haul.
10—20	..	Length varies according to the depth of water in which it is used. This net is principally employed for fishing in creeks and reservoirs. A hauling line is attached to the centre and small weights are fastened at the periphery.	Grey mullets, prawns.	A " Stringless cast-net ". Pagli and Kakani pag are modifications of this net.
Cost of each long line Re. 1. Cost of 100 hooks Rs. 2.	1 boat and 4 men.	About 100—400 hooks suspended from one line. One end of the line is attached to a float and the other is carried in a boat. By means of anchors the line is kept stretched at any requisite depth.	Rays, sharks, cat-fishes, Indian salmon, etc.	Used from September to the end of May.

* Pre-war costs.

(c) *Fishing gear used in the north-Canara area (from Majali on the southern Province).*

Type of fishing implement.	Vernacular name.	Dimensions.		Size of mesh.	Material.
		Length.	Breadth or depth.		
I. Fixed or stationary nets.	(1) Zangad.	100—150′	12—15′	3″ ..	Hemp ..
	Budi or Budichi (2) Wagh jal.	100—150′	12—15′	9″ ..	Hemp ..
	(3) Phansa jal.	100—150′	12—15′	7″ ..	Hemp
	(4) Bangada jal	Rectangular net of various dimensions.		1″ ..	Hemp or cotton
II. Bag nets ..	Maribale (a bag net with long leader wings).	60′ ..	Broadened near the mouth end.	Size of mesh varies from ½ to 1½″.	The bag is made of hemp : the leader wings of coir rope.
III. Drift nets	(*i*) Vavri ..	180—240′	12—15′	2″ ..	Hemp ..
	(*ii*) Mag ..				
	(*iii*) Beed net ..				
IV. Inshore drag net.	Payodha ..	18′ ..	12′ ..	½—¾″ ..	Hemp ..
V. Cast net ..	Shendi ..	Circumference at mouth =15—36′	12—15′	½—⅝″ ..	Hemp ..
VI. Hooks and lines.	..	Length of line. =40—50′ Length of rod. = 8′		..	Line made from 15″ long fibres of the Bherla palm tree.

boundary of Goa to Bhatkal, near the southernmost coastal limit of the Bombay

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
12 12 12	.. .. ..	12—16 pieces joined together. Big stones are suspended from each end of the lower edge of the net. Wooden floats are tied to the head rope at regular intervals.	(1) Cat-fish, sharks, etc. (2) Rays and skates. (3) Sharks.	
Variable	..	Operation similar to above ..	Mackerel ..	"Bangada" is the Canarese name for mackerel.
100	Two boats and 6 men.	Weights are suspended from the lower portion of the bag and the wings. The upper edge is provided with floats. The net is kept stationary in one place. Fishermen try to frighten shoals of fish by shouting and throwing stones, and skilfully direct them into the bat.	Cat-fishes, Jew-fishes, Indian salmon, etc.	
10—15	One boat and 4 or 5 men.	12—15 pieces are linked together to form a fleet. This is the commonest form of a gilling net.	Pomfret, seer, silver-bar fish, etc.	
6	40 men and 1 boat.	25—30 pieces joined together. The construction of the net and its operation similar to the Rampan net described under "Konkan" area.	Sardine, prawns, mullets.	
6	One boat and 2 men.	A "st ingless cast net". The edges are strung with lead rings.	Prawns, mullets, etc.	
2—3	..	The line is attached to a thin bamboo rod 8′ in length. There is a sinker (lead) and a single hook at the end of the line. Bait : pieces of sardine, prawns, etc	Miscellaneous bottom-feeders.	

*Pre-war costs.

(*d*) *Fishing gear used in the south-Canara area (from the southern boundary of*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Fixed or stationary nets.	(*i*) Gorati balai ..	45′ .. Length of each cross-stick (*i.e.*, the vertical height of mouth) = 8—9″.	Width of mouth. =15—18″. Depth of each pocket =18—28″.	$\frac{1}{2}$—$\frac{5}{8}$″	Cotton ..
	(*ii*) Endi balai ..	27′ ..	10′ ..	2″ ..	Cotton ..
II. Bag net ..	Vai balai (also called Nulu balai and Mari balai).	(*a*) Length of Bag= 36′. Circumference at mouth=120′. (*b*) Wings=90′×60′.		$\frac{3}{8}$—$\frac{7}{8}$″ ..	(*a*) Cotton ..
				1—2″ ..	(*b*) Coir ..
III. Inshore drag net.	Rampani ..	1,800′ ..	15—20′	$\frac{1}{2}$—1$\frac{1}{4}$″	Sann hemp ..

the Bombay Province down to the mouth of Balipatam river, near Cannanore).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	2 to 20 men depending on the number of pieces used.	A long piece of netting is doubled upon itself lengthwise and sewn at the ends. The mouth is crossed by 30—40 short sticks which break it (mouth) up into small deep pockets. Floats (generally empty tin cans) are attached to one edge of the mouth. Generally 8 pieces are laced end to end. The men extend the net between them to the widest extent, in the form of a crescent, run with it for a short distance and then close up.	Mullets, prawns, etc.	This is a specialized form of the Konda valai used in the Coromandal Coast.
5 ..	4 to 6 men	The net is a rectangular strip; each end of which is tied to a transversely placed bamboo pole. The net is placed flat in shallow waters, on the bottom. Fish is driven towards the region where the net lies submerged by persons dragging a "scare-line". When the scare-line arrives close to the net, the men who tend the net suddenly raise it from the bottom. Used in shallow eatuaries.	Mullets ..	A "scare-line" is generally bunches of coccanut leaves strung on a coir rope.
250 ..	Two canoes with a total crew of 10 to 14 men.	The net is similar to the "Odam vala" described in detail under "Malabar" area.	Shoaling pelagic fishes such as sardine, mackerel, ribbon-fish, etc.	A very important net.
1,750—3,500.	One boat, "padagu" and 70 to 80 men.	For description and mode of operation refer to the Rampan under "Konkan" area.	All shoaling fishes which approach the shore; mainly sardine and mackerels.	

* Pre-war costs.

(d) Fishing gear used in the south-Canara area (from the southern boundary

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
IV. Drift nets	(*i*) Kandadi balai	108′ ..	18′ ..	2—3″	Hemp ..
	(*ii*) Acha balai ..	75′ ..	9′ ..	2½—4″	
	(*iii*) Aiburla balai	60—75′ ..	9′ ..	2½″	
	(*iv*) Shoraku balai	75′ ..	9′ ..	6″	
V. (*a*) Gilling nets.	Patti balai ..	72′ ..	30—36′	⅞—1″	Cotton ..
(*b*) Anchored gilling net.	Kanda balai ..	45—75′ ..	6—9′ ..	1⅛—3″	Hemp ..
(*c*) Cast net	Ub balai ..	Diameter =40′.	at mouth	¾″ ..	Cotton ..

of the Bombay Province down to the mouth of Balipatam river, near Cannanore)—contd.

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs. About 35.	1 boat and 3 to 4 men.	The nets are used in fleets. Floats are attached to the head-rope and stone-sinkers are hung from the foot-rope. A long cord is tied to one end of the head-rope. The free end of this cord is carried in a canoe, which along with the net drifts with the current.	Seer, pomfret, cat fishes small sharks, rays, etc.	The mesh dimension are adjusted to gill particular fishes : Shoraku balai for instance is intended to catch sharks and rays.
15	Two canoes with a total crew of 10 to 20 men.	Two canoes each with 7-8 pieces of netting start from the shore. When a shoal is sighted, the crew lace together the two sets of netting and row rapidly in semi-circular courses away from each other, in an endeavour to enclose the shaol in a vertical wall of netting. The crew then frighten the fish inside the enclosure. The fish scatter in all directions and get firmly gilled when they dash against the net.	Mackerels, lactarius, etc.	
10	..	5 or 6 pieces are joined together when in use. The net is anchored in position by placing heavy stones on the foot-rope. Generally set in shallow water at about dusk. The head-rope is kept afloat with the help of light wooden floats. The net is hauled up next morning and any fish that has been gilled is removed.	..	These net are peculiars to Malpe and Hossabetten.
..	..	This is the largest of all the casting nets used in the South-Canara coast. The other cast nets used are (*a*) Nangu balai (*b*) Parla balai (c) Tikkala balai (d)Tikkanda balai. All these nets are constructed on the same plan ; only the mesh dimensions are different. For description and mode of operation refer to " Vichu vala " under Malabar.	Sardine and mackerel.	

* Pre-war costs.

(d) Fishing gear used in the south Canara area (from the southern boundary of

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
VII. Long lines	Cheria beppu ..	Line = 1,800′. Hooks= 1-2″ Snoods=9″.	..	..	..
	Valia beppu ..	..	..	..	..

the Bombay Province down to the mouth of Balipatam river, near Cannanore) —concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	The length of the line is increased (sometimes up to 5,400′) where the fishing is profitable. Lines are buoyed up at each end with wooden floats, and stone sinkers anchor them in position. The hooks are adjusted to lie at 90—250′ depth. Refer to "Malabar Coast area".	Cat-fish, seer, Jew-fish, cock-up, small sharks, etc.	

(*e*) *Fishing gear used in the Malabar coast area (from Cannanore in*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
.. Seine nets	(*i*) Odam vala (also called Peru vala and Paithu vala).	(*a*) 40—45′ —circumference at mouth = 150′.	..	(*a*) $\frac{1}{8}$—$\frac{1}{2}$″	Cotton ..
		(*b*) 60—68′		(*b*) 8—9″	Coir ..
		(*c*) Each 160′.		(*c*) 3′.	Coir ..
	(*iii*) Vakku vala (*see* plate 53).	Length of bag = 48′		$\frac{1}{2}$″ ..	
		Length of platform = 66′.		7—9″ ..	Hemp ..
		Length of wings = 125.′		1—3′	
	(*iii*) Kolli vala	60′ ..	18′ ..	$\frac{5}{8}$″ ..	Hemp ..
	("Killer net") ..	50′ ..	30′ ..	1″ ..	Hemp ..

the north to Cape Comorin, the southernmost point of India).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
150—250	Two large canoes and a crew of 14.	The net is made in 3 part (*a*) a wide-mouthed cotton bag (" Vala ") (*b*) a coir-net platform, Keezha vala, in-front of the mouth (*c*) two long wings one on either side of the mouth. A stout warp is attached to the free end of each wing. Several wooden floats (large and small) are attached to the head-rope. On the foot rope a big stone is hung from each corner of the Keezha vala. Half of the net is loaded into each of the two canoes. When a shoal is sighted, the canoes separate paying out the net. After moving in a semi-cricle the canoes approach again. The shoal is first encompassed within the wings and then forced into the bag.	Shoaling pelagic fishes—chiefly sardine mackerels, silver-bellies, mullets, ribbon-fish, etc	
..	2 boats and 10 to 15 men.	Very similar to the Odam vala described above. The operation is also similar. The net is stronger, being of hemp ; but the meshes are large and the weight is not unmanageable.	Big cat-fishes, Jew fishes, etc.	
30—50 80—100	2 boats and a large crew.	These are of two kinds—Mathi-Kolli vala for sardine and Aiyla-Kolli vala for mackerels. The design is similar to the Odam vala described above ; but the platform and sides here are of small mesh cotton instead of coir and the wings are also small. The Kolli vala can be manoeuvred into position more easily than the Odam vala. The shoals are literally frightened and huddled into the net by the loud-noise and the splashing resorted to by the fishermen.	Sardine with the Mathi-Kolli vala and mackerels with the Aiyla-Kolli vala.	The use of Kolli vala is forbidden by local fishermen's *panchayats* in several villages in Malabar.

* Pre-war costs.

(*e*) *Fishing gear used in the Malabar coast area (from Cannanore in*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
II. Drift nets	(*i*) Kandadi vala	55′ ..	18′ ..	2″ ..	Hemp ..
	(*ii*) Odu vala ..	40′ ..	16′ ..	2½—3″	
	(*iii*) Nariyan vala	30′ ..	17′ ..	4″ ..	
	(*iv*) Sravu vala ..	24′ ..	18′ ..	8″ ..	
	(*v*) Thirandi vala	70′ ..	17′ ..	6″ ..	
III. Gilling nets	(*i*) Aiyla Chala vala.	48—60′ ..	30—36′	⅞—1″	Cotton ..
	(*ii*) Mathi Chala vala.	36—90′ ..	12—18′	¾—1″	Cotton ..
IV. Cast net ..	Vichu vala ..	Large variations in size and mesh dimensions.			Cotton ..
V. Hand nets	Arippu vala or Vattu vala.	Small bag shapped net		½″ ..	Cotton ..
VI. Long lining	(*i*) Cheria beppu or Ayiram chundu.	Line = 1,000—3,500′ long. Hooks of length—1 to 2″ attached every 5—6 ft. from 9″ snoods.			Cotton tanned with an infusion of "*panachika* bark".

the north to Cape Comorin, the southernmost point of India)—contd.

* Cost	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
40 35 50 125 50	1 boat and 4 to 6 men.	Used in fleets of 8—10 pieces laced together. Construction and operation similar to the drift nets described under south-Canara area.	Seer, whiting, cat fishes, sharks, rays, etc.	Principal season for small size fishes—October to December ; for sharks etc. January to March.
50 50	Two canoes and a large crew.	Two canoes each with 6—8 pieces of net required. When a shoal is seen approaching the shore, the crew lace together the two sets of nets and row rapidly on opposed semi-circular courses. The shoal is thus trapped in a fence-like ring of netting. By making a terrible amount of noise the fish are scattered towards the net. During the impact they get firmly gilled.	(*i*) For mackerels. (*ii*) For sardines.	The use of Chala vala is also forbidden in some villages.
5—25 according to dimensions and size of mesh.	1 boat and 3 men.	The construction and operation same as the Vichu vala used in Malabar backwaters. The size of mesh varies according to the kind of fish it is intended to catch. The nets are also named accordingly. The common varieties are Churuku vala, Pakku vala and Thiruda vala.	Sardine, mackerel, prawns, lactarius, etc.	..
3	..	This hand net is used to dip out prawns. An oval piece of bamboo or cane is fixed around the mouth.	Prawns and small fishes.	..
..	..	The line is buoyed up at each end and small floats are attached at intervals. Stone sinkers are attached to the two ends of the complete line. The length of the buoy line is adjusted to suit the depth of water fished. Bait : pieces of sardine mackerel, prawns, etc.	Cat-fish, seer, Indian Salmon cook-up, sharks, rays, etc.	" Ayiram Chundu " means 1,000 hooks.

* Pre-war costs.

(e) *Fishing gear used in the Malabar coast area (from Cannanore in*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
	(*ii*) Va'ia beppu	Length of line = 600—1,200′. Hooks suspended at 60′ intervals from iron-wire snoods 18″ long. Hooks measure 9″ and are very strong.			Cotton treated with "*panachika* bark".
VII. Harpoon	Chattu'i ..	Length of shaft = 8—10′ .. Length of the single barbed iron point = 8″.			Attached to a line 240′ in length.

Note.- The attention of the net fisherman on the Malabar and South-Canara coasts is given to the netting of demersal fishes, a branch of the industry left almost entirely to the

the north to Cape Comorin, the southernmost point of India)—concld.

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	The line is set as described under Cheria beppu. Bait : large pieces of fish or sometimes beef. This line is set very near the bottom, some 7-8 miles away from shore.	Large sharks, rays and dolphins.	
About 6	1 canoe and 3 to 4 men.	The shaft is thrown with great force at large fishes, *e.g.*, sharks, rays, etc., and the fish landed with the help of the attached line.	Sharks large rays, dolphins, etc.	Harpoons are carried by line fishermen and used whenever an opportunity presents itself

"concentrated almost entirely on the capture of shoaling fishes migratory and pelagic. So in regard line fishermen, who form, however, a very small proportion of the fishing community" (Francis).

* Pre-war costs.

(f) Fishing gear used in the Malabar

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Fixed or stationary nets.	(*i*) Valu valai or Unni-kuthu vala.	20—30′ .. circumference at mouth about 30″ (a conical bag net with a long and tapering cod-end).		$\frac{1}{8}$″ at cod-end to 9″ at mouth	Cotton, tanned with the bark of " Odyan maram ".
	(*ii*) Endi balai ..	27′ ..	10′ ... (Rectangular).	2″ ..	Cotton ..
II. Bag net ..	Chavittu vala (Bag net whose mouth is kept open by a half loop of bamboo).	6′ ..	Length of chord of half-loop = 5 feet. Height of chord of half-loop = 3 feet.	$\frac{1}{2}$″ ..	Cotton ..
III. Drift nets	Kola vala ..	900′ ..	15′ ..	8″ ..	Hemp ..

and south-Canara areas (back-water fisheries).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	There is a thick coir-rope along the mouth of the net. Stout rings are attached to this rope. Each net is held in position by two stakes, 3-4 ft. apart, driven into the muddy bottom. The rings are slipped on these stakes. The net is set when the ebb tide has commenced. During strong tide many fishes enter the back-water. Of these many are unable to swim against the strong current and are washed to the banks of the back-water where these nets are placed. Valu valai is generally set in series and is very effective if there is a strong current.	Prawns, small cat-fishes, seer, sardine, etc.	These nets are used in Cochin and Travancore back-waters. The setting of the net follows the phases of the moon.
5	4 men	Transverse bamboo poles are tied to the ends of the rectangular net and the net laid flat on the bottom of the back-water. Fish is driven to the region above the submerged net with the help of a scare-line. The net is then suddenly lifted.	Grey mullets ..	Very common in Kundapur (Coondapur).
5	1 man ..	The net is set in 2-3 feet of water with the horns of the half-loop resting on the ground and the bag facing the current. As soon as a fish enters the bag the mouth is closed and the net lifted.	Miscellaneous small fish and prawns.	Very common in Cochin back-waters.
..	1 canoe and 4 to 5 men.	Used at nights in the estuarine parts of back-waters, near the sea-ward channels. Buoys are attached to the head rope at 2 feet intervals and heavy stone sinkers to the foot-rope. Fish are gilled and also enmeshed in the folds of the net.	All types of sea-fishes, chiefly seer, pomfret, cock-up, etc.	

* Pre-war costs.

(*f*) *Fishing gear used in the Malabar and*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
IV. Drag net	(*i*) Vadi vala ..	Wide variations	..	$\frac{1}{2}$—2″ ..	Cotton thread
	(*ii*) Ola vala ..				
	(*iii*) Telikanni vala.				
	(*iv*) Pattukanni vala.				
V. Cast net (stringed)	Vichu vala (various local names).	Large variations ..		$\frac{3}{8}$—$\frac{3}{4}$″	Cotton tanned with an infusion of "*panachika* bark".
VI. Dip nets ..	(*i*) Kai valai (Hand dip net)	2′ .. 2′ .. (Suspended from the ends of two curved sticks which cross at right angles in the middle) ..		$\frac{1}{4}$—$\frac{1}{2}$″ ..	Cotton ..
	(*ii*) Chinese dip net or Cheena vala. (*See* plate 55).	30—35′ square (shallow bag net with a narrow cod-end).		..	Cotton tanned with an infusion of "*panachika* bar".

south Canara areas (back water fisheries)—contd.

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	These bag-like nets are made by doubling a piece of netting lengthwise and sewing the two ends. Cross-sticks, globular floats or even empty cans strung together are employed to keep the mouth open. These nets are set in shallow water and dragged towards the shore.	Miscellaneous catch.	
5 to 25 depending on dimensions and size of mesh.	1 boat and 3 to 4 men.	All cast nets are conical in shape with an opening at the apex through which the hauling-in line passes. This line sub-divides into several secondary strings inside the cone. The peripheral cord is weighted with lead. When cast the peripheral margin first meets the water and describes a circle. This then rapidly sinks owing to the presence of weights. When the net has reached the bottom the hauling-cord is pulled till the lead weights converge and meet, forming another cone inside the big one. Thus is effected the imprisonment of several fishes in the circular ring shaped marginal pouch.	All kinds of fishes, pelagic and demersal.	
2—3 ..	One or two men.	A cord is tied to the crossing of the mouth sticks and the net is lowered vertically into the water. When fishing for crabs a strong smelling bait is tied at the centre of the net.		
100—200	5 to 6 men	The huge net is stretched from crossed bamboo poles in the same manner as in the hand net described above. For working the net a complicated counterpoised framework is necessary. The net is vertically lowered into the water and raised.	All kinds of surface swimming fishes.	Seen in large number in the Cochin backwaters.

* Pre-war costs.

(f) Fishing gear used in the Malabar and

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
VII. Miscellaneous—					
(1) Harpoon	Chattuli ..	A sharp one barbed missle with a line attached, thrown			
(2) Cross-bow	Parangipathi ..	A sharp one barbed missle shot into the water with			
(3) Blow-gun	Thumbithan ..	A hollow bamboo tube plugged at the bottom with a murral, by powerfully blowing at the open end			
(4) Hand line	Kai-choonda ..	Line made up of Sann hemp. The hooks are of Euro-			
(5) Rod and line	..	A light elastic bamboo 8 feet long serves as rod. used. Bait : prawns.			
(6) Basket traps	Kudu or Ottal ..	Various types, all made of bamboo. These sieve out located in the shallow water.			

south-Canara areas (back-water fisheries)—concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
		with strong force at a shark or dog-fish.		
		the aid of a contrivance looking like a cross bow.		
		barbed missle with an attached line. The dart is ejected with strong force at a fish, generally a of the bamboo tube.		
		pean manufacture. Bait : prawns.		
		The line is of cotton. Snoods made from fibres of " Kitul " palm tree. Small hooks with one barb		
		the fish in a stream of water passing through the basket. Some varieties are used to imprison fishes		

(g) *Fishing gear used in the Gulf of Mannar area (from Palk*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Fixed or stationary net.	Kalamkatti valai	..		..	..
II. Seine net	Vangu valai ..	..	..	..	..
III. Trawl-type nets	Madi valai ..	Bag—54′ Wings—75′ Screens—75′ Rope—108′	30′ .. 30′ .. 9′	¼—1″ .. 1—2′ }	Cotton .. Hemp .. Coir.
IV. Drift net	(i) Vala valai ..	144′ ..	30′ ..	1¼″ ..	Light cotton, unbarked.
	(ii) Kola valai ..	84′ ..	33′ ..	½″ ..	Cotton, unbarked.

Cape Comorin to Point Calimere, consisting of the Gulf of Mannar and the Strait Bay).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	The net is best used during high tide periods with strong westerly winds. When the tide has receded to its full extent a gill net is buried in a shallow trench excavated in the sand near the water's edge. The incoming tide passes over the buried net and brings in its quota of fishes ; then at the turn of the tide the net is raised above the water and staked in this position. A screen is thus erected to prevent the escape of fish with the receding tide and when the water is well down the fishes are taken in baskets.	Grey mullets ..	Good hauls are made in June and July.
..	2 men ..	It is a small seine-type net plied in the shallow lagoons. The catch is almost wholly utilised by the line fishermen for bait.	Prawns.	
75	2 catamarans and 6 men.	A primitive trawl net. Two catamarans each with one end of the net aboard, sail on a parallel course maintaining a definite distance between them. This arrangement enables the mouth of the net being kept open. The catamarans close up when the net is to be hauled.	Miscellaneous catch consisting of sardine, silver-bellies, etc.	This net is mostly used during the N. E. monsoon.
..	1 boat and 3 to 4 men.	Each fishing boat carries a fleet of seven nets. The upper edge is buoyed with large wooden floats and the lower weighted with small stone sinkers. The boat with the net trailing behind it is allowed to drift.	Silver bar fish (*Chirocentrus dorab*).	This is the most important fishing net and fishery in this region.
15—20	1 boat and 3 to 4 men.	Small drift net used in the same manner as Vala valai but operated nearer the shore. A fleet consists of 8—9 nets. Used from September to middle of February.	Sardines and anchovies.	

* Pre-war costs.

(g) *Fishing gear used in the Gulf of Mannar area (from Cape Comorin to*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
V. Trolling ..	..	..	..	..	..
VI. Inshore lining	Practised from November to March, *i. e.*, during the N. E. monsoon and small fishes are caught. Bait : prawns.				
VII. Off-shore lining	These fishermen venture far out into the sea. Usually practised in rocky such uneven places and so hand lines are used. Bait : prawns.				

Point Calimere, consisting of the Gulf of Mannar and the Palk Strait Bay)—concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	In this region a number of fishermen are engaged in what is called "trolling". The method appears to be sailing in a boat with a line to which bait is attached the bait being dragged along the bottom.	Seer fish ..	The best food-fish (seer) is almost wholly obtained by trolling.

and after. The line is set as usual with several snoods each containing a hooked bait. Large

banks covered with sea-weeds or among coral and spongy colonies. Long lining is not possible in

(*h*) *Fishing gear used in the Coromandel coast area (from Point Calimere along the*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
Bag nets ..	(*i*) Mada valai (Also called Mara valai, Eda or Yeda valai, Nida valai and Kambi valai).	60′ ..	48′ ..	2½″ near mouth to 1″ near the apex.	Cotton twine near the mouth; hemp near the apex.
	(*ii*) Thuri valai	Length of bag=40′ .. Length of wings=70′ ..		½″ near cod-end. 2½″ in the wings.	Cotton for the bag and wings. The cod-end is sometimes made of hemp.
	(*iii*) Eru valai ..	A conical bag net Dimensions variable but the net is a small one.		1″ ..	Cotton

east Madras coast to the Pulicat Lake, a point about 100 miles to the north of Madras).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
250	4 catamarans and 14 men.	The net is a shallow bag with a wide rectangular mouth. A thick rope (foot-rope) is provided on one side. This rope carries two stone sinkers at the two ends. Coir head-ropes along the remaining 3 sides and 2 hauling-in lines attached to two loops in the foot-rope complete the equipment. The net is used in conjunction with "fish-lures" called *kambi*. These consist of strings of cocoanut leaves attached to a rope and moored in the sea at the commencement of the fishing season. The *kambi* is kept in position with wooden buoys and stone sinkers. Fish are attracted by the shade provided by the *kambi* and crowd round it. By clever manœuvering the fishermen slip the net under the *kambi* rope and hoist the net quickly along with the *kambi* without frightening the fish. There would be more than a dozen *kambi* for each net.	Miscellaneous pelagic fishes. Also shoals of pomfrets, sardines mackerels, etc.	When shoals of pomfrets, sardines, etc., are seen, the net is used without a *kambi*; the moving shoal then takes the place of the stationery *kambi*.
200	2 catamarans and 8 men.	A primitive trawl net where the mouth is kept stretched by two catamarans sailing in a parallel course at an appropriate distance apart. The net is first shot across the current. The catamarans then turn about and row parallel to each other along with the current. The net is thus dragged along the bottom.	Demersal fishes, *e.g.*, soles, catfishes, rays, etc.	
15—20	1 catamaran and 4 men.	Shot from catamarans but not dragged. The mouth of the bag always faces the shore. This net is designed to operate at a higher level than the bottom scouring Thuri valai and is fitted with numerous floats which help to keep it near the surface.	Prawns and other shoaling fishes which come near the shore.	

* Pre-war costs.

(*h*) *Fishing gear used in the Coromandel coast area (from Point Calimere along Madras)*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
II. Seine nets..	(*i*) Kola valai ..	Length of bag = 12′ Length of wings=45′ Diameter near mouth, =3′	..	¼″ ..	Cotton ..
III. Inshore drag nets	Peria valai ..	Length of bag=21′ Net = 36′ Wings=700′	36′ .. 45′	..	Hemp ..
IV. Gillnet ..	(*i*) Vala valai ..	150′—180′	16—20′	2″ ..	Light cotton ..
	(*ii*) Kanni valai	256′ ..	16′ ..	3—4″ ..	Hemp ..
	(*iii*) Thirukkai valai.	120′ ..	12—18′	5″ ..	Hemp ..
V. Lines ..	Lines with a terminal lead sinker and two snoods are used in the Coro-lining is not practised as in Malabar. A species of *eunoid* worm				

the East Madras coast to the Pulicat Lake, a point about 100 miles to the north of —contd.

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs. 20	2 catamarans and 6 men.	The mouth of the bag is kept distended with 100 wooden rods fixed to the head-and foot ropes. Numerous wooden floats are attached at regular intervals to the head-rope. Two catamarans start from the same point each with one half of the net, make a circuit and come together again. A pelagic shoal is surrounded during this operation. When hauling commences the wings prevent the shoal from scattering.	Pelagic shoaling fishes.	
350	One *padagu* and 10 to 15 men.	The bag-like portion is in two sections, a wide funnel-shaped *melavalai* and a rectangular cod-end, *madi* To two ends of the *melavalai*, long "leader-wings" of netting are attached. The mouth of the bag and the wings, are provided with stout head and foot-ropes. Floats are attached to the head-rope at regular intervals. The net is shot near the surf-beaten shore from a special boat called *padagu*, and, by rowing round in a circle a shoal is enclosed and trapped. The net is then dragged towards the shore.	Shoaling fishes like mackerels ribbon-fish, silver-bar fish and prawns.	*Padagu* is built of planks without frames or ribs and is well adapted to take the severe knockings from the surf.
..	One catamaran and 4 men.	The net is provided with floats and sinkers as in drift nets elsewhere. A fleet consisting of 4 pieces is used. The depth is adjusted not to exceed 40 feet. Dark nights are chosen so that the fish might not easily see the obstacle in their path.	Pomfret, seer, cock-up, Indian salmon, etc.	
20	Do. ..	Similar to above.		
20	Do. ..	Construction similar to Vala valai. Thirukkai valai is of coarse mesh and is adjusted for bottom fishing.	Skates, rays and saw-fishes.	

mandel coast. The size of the hook and the bait depend upon the kind of the fish sought. Long found in the sand below half-tide level is a popular bait.

* Pre-war costs.

(*i*) *Fishing gear used in the Coromandel*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Fixed or stationary nets.	(*i*) Kala valai ..	40′ ..	2½′ ..	6″ ..	Hemp ..
	(*ii*) Kattu valai (*see* plate 56).	Length variable.	..	Submerged net = 2½″. Second net = 1½″.	Cotton ..
II. Small drag nets.	(*i*) Konda valai	60′ .. 30—40 .. "spreader sticks" which are shorter than the width of the net.	Depth—back to front 5½—9′.	⅜—⅞″.	Cotton ..

coast area (back-water fisheries).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	The net is set in the fair-way of a channel leading from a back-water to the sea. It is tied to strong poles driven in the sand. During high-tide when sea-water rushes over the bar, many fishes show a tendency to pass out against the current. Those that come into contact with the net are gilled.	Mullets, cock-up etc.	..
..	..	Two lines of nets are hung from two parallel series of stakes. The first series projects a foot above the surface of water at high tide. The stakes in the second series, coming 2-3 feet behind the first, are 2-3 feet longer. A coarse net tied to the first row of stakes lies submerged like a screen. A second net is hung by its upper edges from the longer series of stakes. The lower edge of this net is looped up and tied to the same stakes a few inches above the water level. Thus a slack longitudinal pocket is produced between the two rows of stakes. Fish encountering the submerged net try to clear the obstruction by leaping out of the water. They strike the curtain of net behind and fall into the pocket.	Mullets. Also cock-up which is gilled in the meshes of the submerged net.	This net is a very important one in the back-waters. It is usually set in the evening, and the fish collected in the morning.
5	4 men when one piece is used; x ×4—when used collectivelv (x = number of pieces).	A long broad strip of netting is sewn at the sides. The upper and lower margins of the mouth are connected and distended with "spreader sticks". The lower margin of the net is dragged along the bottom of the shallow back-water or along the roots of water weeds. This net dislodges fishes that burrow	Prawns and small fishes.	A very useful net in the shallow back-waters.

* Pre-war costs.

(i) Fishing gear used in the Coromande

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
II. Small drag nets—*contd.*	(*i*) Konda valai	60′ .. 30—40 "spreader sticks" which are shorter than the width of the net.	Depth—back to front = 5½—9′	⅜—⅞″.	Cotton ..
III. Gill nets	(*i*) Kalla valai ..	180—240′	2½′ ..	3′ ..	Light cotton net.
	(*ii*) Koduva valai	12′ ..	36″ ..	5—5½″	Cotton ..
IV. Casting net	Vicha valai ..	The circumference at the mouth and the height of the cone variable.		½″ ..	Cotton ..

coast area (back-water fisheries)—contd.

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs. 5	4 men when one piece is used ; x × 4— when used collectively (x= number of pieces).	in the soft mud. Several units of this net may be linked together and set in the form of a crescent facing a shore. In this method of collective fishing, the net is not dragged, but fishes are driven into the area enclosed by the net by fishermen dragging a " scare-line " (strips of palm leaves attached to a cord). The crescent closes into a circular enclosure and by collapsing portions of the net the fish are egged on into the pockets.	Prawns and small fishes.	A very useful net in the shallow back-waters.
..	..	Worked in teams and used wherever water is more than 2½′ deep, in the early hours of the morning. Both ends are left free and hence the net is slack and is swayed by the current. Fish get caught in 2 ways : (1) gilled when trying to swim through, (2) by being entangled in the meshes. In Ennur backwaters the net is used as a stationary net. The ends are tied to 2 poles, but the net is not kept tightly stretched. Fish are driven towards the net with a scare-line.	Cock-up, mullets, lactarius, etc.	Kanni valai, Kottu valai, Pusal valai and Kendai valai are names of other similar nets.
5—6	5 boats and 20 to 40 men.	The construction of the net is very similar to the Konda valai. 50 units are employed in collective fishing, arranged end to end in a semi-circle in shallow water, 2—2½ ft. deep. Fish are driven into the semi-circular wall of netting by dragging a scare-line, by shouting and splashing.	Cock-up ..	*Lates calcarifer* is called *kodvua* in Tamil.
5	One boat and 2 to 3 men.	Stringed variety with 20 radial cords attached to the lower circular margin of the net. The margin of the cone is weighted with beads of iron or lead. Operated in a manner similar to other casting nets.	Prawns, small fishes.	Eral valai, Sama valai, Thoni valai and Mani valai are different names for cast nets. These differ only in size of mesh.

* Pre-war costs.

(*i*) *Fishing gear used in the Coromandel*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
V. "Pouch trap" "Hemispherically shaped nets with enormous circular mouths and shallow basin-shaped net bodies" (Hornell.).	Iriga valai ..	Circumference at mouth = 120′.		2″ ..	Cotton ..
VI. Hoop net	..	Diameter of ring = 2′		3″ ..	Cotton ..
VII. Long lining	Tamani Kayaru..	Length of line = 600—900′ : Thickness = ¼″ Snoods 18″ attached every 6′ : Length of hooks = 1½″.		..	Coir rope ..

coast area (back-water fisheries)—concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	4 to 6 men	One portion of the mouth of the net is kept floating on the surface, while the diametrically opposite section is held on the bottom of the back-water somewhat in advance of the floating end. Fish is driven into the pouch by making all sorts of frightening noise. This accomplished, the lower edge is hurriedly scooped up from the bottom and brought into contact with the elevated head-rope.	Mullets ..	Other "Pouch traps" in use are Sinna iriga valai, Kal valai and Thattu valai.
2	2	Shallow conical bag suspended from an iron ring. The bait, a dead frog, is tied across the mouth. The net is lowered to the bottom of the back-water and examined after an interval of several hours.	Crabs ..	
..	..	Line buoyed up with light wooden floats. The two ends are fixed to 2 bamboo posts driven into the mud. Bait : prawns.	Cat-fishes ..	

(j) Fishing gear used in the Telegu area (from Pulicat Lake northwards

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Bag nets	(*i*) Pedda valai ..	Bag—39′..	18′ ..	$\frac{1}{2}$″ ..	..
		Sides—960′	27′ ..	2—4″ ..	..
	(*ii*) Iraga valai	Bag—22′..	7′ ..	..	..
		Sides—50′	12′ ..	..	..
	(*iii*) Katta valai	180—240′	60—75′..	..	..
	(*iv*) Kavala valai	Diameter of the mouth 30—60′. (A circular mouth).		..	..
I. Pouch trap	Siru valai ..	Circumference of the mouth = 75′.		$\frac{7}{8}$″ ..	Cotton ..
III. Cast net	Bhakti jal ..	1,200′ ..	9′ ..	7—8″ ..	Cotton ..
	Khepa ..	37′ ..	18′ ..	2″ ..	..
	Noli ..	320′ ..	3′ ..	3—5″ ..	..
	Menjia jal ..	320′ ..	$1\frac{1}{2}$′ ..	$\frac{1}{10}$″ ..	..
V. Lining ..	..	Length of line 300—600′			..
		Length of hooks 1—7″			..

to Puri in Orissa, including the Chilka Lake).

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	....	..	
..	..	....	..	..
..	..	....	..	..
..	..	....	..	..
..	..	....	..	..
..	..	....	..	..
..	6 to 8 men	The net is a wide-mouthed shallow pouch with a small bag-like cod-end attached to the middle of the blind or hinder end. 30—40 wooden floats are attached to the head-rope. There are no sinkers. This net is set by tying to two posts driven in the bed of the back-water or estuary, in water about 3 feet deep. Two persons keep the ground rope at the bottom by treading on it. A group of people by shouting, splashing and dragging a scare-line drive the fish towards the mouth of the net.	..	This net is used in the Chilka Lake.
...	..	....	..	Used in the Chilka Lake.
..	..	....	..	
..	..	....	..	
..	..	....	..	
..	..	Long lining and single-hook lining also practised. Bait : prawns.	..	

(*k*) *Fishing gear used in the Deltaic area (the estuaries of the Mahanadi, the*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Bag net ..	(*i*) Suti jál ..	15—20′ .. .. Height of Wing = 4—5′ Circumference at mouth = 15 feet.		..	..
				¼″ ..	Cotton ..
	(*ii*) Bada Jál ..	..	..	..	..
II. Seine nets	(*i*) Ber jál ..	*ca* 1,000′ ..	30′ ..	Varies from ¼—2″.	Cotton or Sann hemp.

Ganga and the Brahmaputra, stretching from Puri to Sunderbans in West Bengal).

* Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
20	..	Leader wings extend from each side of the mouth and are supported on stakes. A stake passing through the centre of the mouth 'anchors' the bag and serves also to keep the mouth distended. The head-rope and the foot-rope are tied to this stake. The posterior end (cod-end) of the bag is lashed with a string when in use. This net is set in river estuaries where there is a strong tidal action.	Cock-up, hilsa, pomfrets.	
		No leader wings but the mouth is made very wide. Two rods placed at the angle of the mouth keep the mouth fully distended. A float is attached to the head-rope. The net is tied to stakes driven in the river bed.		
50—500	Several boats and men.	A number of light floats attached to the head-rope help to keep this end afloat on the surface of the water. Sinkers are absent. Two long hauling ropes are attached one to each end of the net proper. The net is loaded into one or several boats and paid out in a semi-circle from a bank. The net is then dragged towards the shore. When operated in enclosed waters, fishes are sometimes driven into the enclosure of the net instead of being sighted and encircled.	..	Used in the broad reaches of the great rivers: the Ganga, the Padma, the Goral, etc.

* Pre-war costs.

(*k*) *Fishing gear used in the Deltaic area (the estuaries of the Mahanadi, the Bengal)*

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
	(*ii*) Kochal jál or Dingi Jál or Jangli Jál.	42′ ..	19—20′..	3—4″ ..	Cotton
III. Trawl-type nets.	Mol jál ..	15′ ..	9′ ..	¼″ ..	Sann hemp ..
IV. Drift nets and Gilling nets.	(*i*) Chhandi jál	36′ ..	24′ ..	1½—2″	Hemp tanned with "*gab*"
	(*ii*) Karai or Katla jál.	Variable		5—6″ ..	Strong hemp twine.

Ganga and the Brahmaputra, stretching from Puri to Sunderbans in West —contd.

* Cost.	Number of men or boats required	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
A complete fleet of 22 pieces costs about 700.	4 to 5 boats (*dingis*) and 24 persons.	A deep seine net of medium mesh generally operated in sets of 20—22 pieces joined together. The net is shot in the usual way, but instead of being dragged the lower edge of the net is turned up to form a rough pocket in which the fish are imprisoned.	Hilsa and pungas cat-fish.	
4—5	2 men ..	A third of the lower edge is folded to form a pocket in the front. Small drum-shaped weights are attached to the lower edge of the mouth of the pocket. To the head-rope a slightly bent bamboo pole is laced on. The pole carries a hauling rope in the middle and two heavy weights, one at each extremity. The net is dragged along the bottom in the manner of an oyster dredge. The sinkers at the lower edge of the pocket serve to dislodge any fish lying on the bottom.	Prawns, cat-fishes and small fishes.	
..	One *chhandi* boat and 3 to 4 men.	24 pieces usually constitute a net. Floats of bamboo or wood tied at intervals of 20′ keep the head-line afloat. The foot-rope is weighted with burnt-clay sinkers. By manipulating the floats and the sinkers the net can be made to float vertically at any desired depth. Shot generally in the evening from the special *chhandi* boat and allowed to drift down-stream. Fishes ascending the river strike the net and become gilled.	Hilsa.	
..	..	Stronger than the *Chhandi* jál. Construction and operation similar.	Cook-up, catla. etc.	

* Pre-war costs.

(k) Fishing gear used in the Deltaic area (the estuaries of the Mahanadi, the Bengal)

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
	(iii) Feripath a ..	24′ ..	9′ ..	5—7″ ..	Hemp ..
	(iv) Dangi ..	Variable		5′ ..	Hemp ..
V Casting net	(i) Khopla jál ..	15—18′ .. Diameter of the mouth—40′.		Variable	Cotton or hemp.
	(ii) Báchári or Othar jál.	Circumference of mouth—180′ Length of the cone—50′		1 to 3½″	Hemp tanned with "*gab*".

Ganga and the Brahmaputra, stretching from Puri to Sunderbans in West —contd.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	Composed of 80—100 pieces. This net is generally set during ebb-tide. It drifts back with the flood-tide.	Cock-up, catla, etc.	Used in the Bakerganj estuary.
..	..	The construction is similar to the *Chhandi* jál. Lines are attached to the two ends of the net. The net is dragged by several men standing on opposite banks with the help of the lines.	..	Used in Jalpaiguri.
..	..	A conical net whose circular edge at the base is bent inwards to a height of 1—2 feet and sewn to the body wall of the cone at regular intervals. A series of looped up pockets is thus formed. The free margins of the pockets are weighted with drum-shaped iron sinkers. The hauling cord, 20 feet long, passes through an opening in the apex. The net is cast in the usual manner. When the apical cord is pulled, the sides of the net collapse and bunch together driving the imprisoned fishes into the pockets.	Miscellaneous fishes.	The doubling of the lower edge of the net forming looped up pockets is a characteristic of the Gangetic nets.
..	1 boat and 4—6 men.	This large and heavy net is shot from a boat in a manner similar to shooting a seine net. When the whole of the net is paid out, the pull of the boat drifting down-stream is transmitted to the net. The weighted edges are dragged together thus enfolding the fishes that had been covered by the net. In this net also the lower margin is turned up and converted into a series of pockets.	Large fishes such as rohu, catla, pungas catfish, cock-up, etc.	

(k) Fishing gear used in the Deltaic area (the estuaries of the Mahanadi, the Bengal)

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
VI. Long lining	Borshi ..	Length of line-1,000—2,500′. Length of snoods=12″. Snoods suspended at intervals of 3—9 feet.			

Notes.—1. The estuaries of the big rivers are generally narrow and shallow. The fore-shore five fathom (30 ft.) line extends to 15—20 miles off the coast. The bottom is of very

2. *Gab* is the Bengali name for the fruit of *Diospyros embryopteris*. The fruits are called

Ganga and the Brahmaputra, stretching from Puri to Sunderbans in West —concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	One end of the line is held in a boat while the other is anchored. Buoys are floated to indicate the position of the line. Bait: different baits are used for different fishes. Generally the bait consists of eels, live crabs or special compositions prepared out of meat, spices and cooked rice.	..	

is also narrow for several miles except for a little stretch at the head of the Bay. The soft alluvial mud.

panachika in Malabar. A decoction obtained from it is in general use for tanning nets.

(*l*) ***Fishing gear***

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Purse nets ..	(*i*) Khárki jál ..	..	..	..	Cotton tanned with *gab*.
	(*ii*) Shangla jál .. (*See* plate 66).	Length of bamboo lips=20′ .. Length of bags=10′ (back to back).		..	Cotton tanned with *gab*.
II. Seine net ..	Koná jál or Bhásha-gúlli.	300′ ..	30′ ..	2″ ..	Cotton tanned with *gab*.

used in the Ganga system of rivers.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	1 boat and 3 men.	This is a purse-shaped rectangular net. To the wide-mouth is attached two flexible bamboo rods, which take the places of the head and foot-ropes of the ordinary nets. These rods hinge at the angle of the mouth. A vertical bamboo attached to the middle of the lower lip passes upwards through a ring in the middle of the upper lip. The net is suspended from the prows of a boat going down-stream. The mouth is kept distended by pressure on the bamboo pole. When a fish enters the net the pressure is released when the mouth immediately closes.	Special hilsa net.	Hilsa fish ascends rivers during the floods. Hence boats plying purse nets move down-stream.
..	1 boat and 2 to 3 men.	The out-line of the mouth is semi-circular. Construction similar to "Kharki" jál, but the manipulation is more delicate. Instead of a bamboo pole, a weighted cord is used to open and close the mouth of the net. Shangla jál can be set at any desired depth.	Hilsa primarily	..
	2 boats and 20 to 30 men.	Bamboo floats are tied to the head-rope at 16 ft. intervals; no sinkers. "Every 30 or 40 ft. apart are openings, 12 ft. wide, leading into large conical small-meshed bag pockets, 20 feet in length. The mouth of these are distended by two bamboo poles crossing one another obliquely from corner to corner. The mouth of each of these bags is trapped by means of a secondary funnel-shaped pouch opening inwards and having an aperture at the apex. The tail end of the	Do. ..	Koná jál with some slight modifications can be used as a Drag net or by fixing to stakes as a stationary multiple bag net.

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
II. Seine net—*contd.*	Koná jal or Bhásha-gúlli.	300′ ..	30′ ..	2″ ..	Cotton tanned with *gab*.
II. Dip nets ..	(*i*) Helá jál ..	(A triangular net)		..	Cotton ..
	(*ii*) Kharrá jál ..	(A triangular net).		..	..
	(*iii*) Bheṛál jál ..	..	..	..	..
	(*iv*) Kholla jal .. or Khorsula jál.	8′ .. 6′ (Rectangular).		Small .. mesh.	Cotton ..

used in the Ganga system of rivers—contd.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	2 boats and 20 to 30 men.	main pouch is bunched together when in use by a cord lashing." (Hornell). The net is shot against the current from boats and the ends are worked round enclosing a circular area of water. The hilsa within this ring rush blindly into the pocket and are caught.	Hilsa primarily	Koná jál with some slight modifications can be used as a drag net or by fixing to stakes as a stationary multiple bag net.
..	..	It consists of two light bamboo poles crossing each other near one end with a triangular net laced along the two long sides. A short cross-stick is fixed across the bamboo poles near the apex of the triangle. When operating the broad end is pushed along the bottom and then jerked upwards to throw any fish that may be into the apical end close to the handle.	Prawns, Cat-fishes, fish fry, etc.	A large number in use for catching carp fingerlings.
..	..	A large triangular Dip net constructed on the above model but worked from a bamboo staging implanted in the river bed.	Do.	
..	..	Similar to above, but worked from a boat.		
		The net is stretched and suspended by the four corners from the ends of two downwardly curved bamboos crossing at right angles in the middle. The net is lowered obliquely into the shallow water near the banks. When a shoal passes near the sunken net, the whole net is suddenly pulled and tumbled over onto one side by pulling a cord tied at the crossing of the bamboo pieces.	Fresh water mullets.	

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
IV. Fish spear	Konch ..	Length of shaft=4½—6′ Length of iron point=1½″.		..	..
V. Harpoon ..	Ek-Katyá ..	Length of shaft—9=10′ Length barbed point=9″		..	..
VI. Fish screens	(*i*) Chachi or páti	30′ ..	3-5′ ..	..	Slender bamboo rods woven into "chicks".
	(*ii*) Salva or pulti (Cuttack).	Do. ..	Do.	..	Do. ..
VII. Baited springs.	Barrá, Kái-barsa or Dátiá	..	..	..	A strong flexible piece of bamboo pointed at both ends.

used in the Ganga system of rivers—contd.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	The Konch consists of 10-16 separate split bamboo spears whose proximal portions are bundled and securely tied. Each spear is fitted with a conical iron point. It is thrown at a fish by a man standing at the prow of a boat.	Large carps and cat-fishes.	There are several modifications with various names.
..	..	The harpoon consists of a bamboo shaft to one end of which a barbed iron point (single or double) is attached. A cord connects the base of the harpoon point with the Shaft.	Do	
..	..	(*a*) *Tidal areas.*—A shallow area is surrounded by a long length of screen at high flood. When the water ebbs the fish are left behind in the muddy pools. (*b*) *Bhe'els.*—The screens are set to mark off shallow areas. The enclosed space is then divided into smaller enclosures by putting up earthen bands. The water is then baled out till the fishes are exposed.	Carps, Cat-fishes, mullets, murral	
..	..	A length of screen is placed like a V. The fishermen then bring the two arms of the V together. From the enclosed space the massed fish is ladled out with hand nets.	Do.	
..	..	The two ends are bent till they nearly meet and the pointed tips are adjusted delicately within the body of a grasshopper, a cockroach or a small frog. The baited spring is then suspended by means of a thin string from a cylindrical float. The fish seizes the bait when the ends spring apart within the mouth or throat.	Climbing perch, murrals, etc.	

(l) Fishing gear

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
VIII. Fish traps	(*i*) Polo or Tappu	Circumference at bottom = 2 ft. .. Circumference at top = 5-6″		2-2½ft. high.	Bamboo
	(*ii*) Chali or Chanchi.	20-30′ ..	3-4′ .. (Rectangular).	..	A raft constructed of reed matting.
IX. Angling ..	..	Length of rods = 6-18′		..	..

used in the Ganga system of rivers—concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks
Rs.				
..	..	Made of split bamboo pieces in the form of a conical basket with a circular opening at the top to permit the hand to enter and used in 2 feet depth of water. The trap is dropped in the water and the wide mouth pressed into the soft mud. The fisherman puts his hand through the opening in the top and gropes in the mud for any fish that the trap might have covered.	..	
..	..	This is floated flat on the wate and has a row of white plantain leaf stems attached to the two longer edges. These stems act as floats and also help to frighten the fish. The raft is towed with two long ropes attached to the two corners o' one of the long sides. When a shoal of mullets is seen. the raft is towed near a bank and the fish d iv en towards the raft by shouting and sp'ashing. Frightened by the white plantain stems the shoal tries to escape by jumping over them. They are neatly caught in the raft.	Fresh-water mullets.	
..	..	Lines made of cotton or waste silk. Country-made iron hooks are used. Sometimes a reel is also attached Bait: earthworms, prawns, silk worms, small murrals, beetles, frogs etc. Cockroach is used when fishing for *Wallago attu*. Dough made from flour or baked rice fragments of fish-flesh or fish-offal and jack fruit is used as a ground bait.	Carps, cat-fishes.	

(m) Fishing gear

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
I. Drag net.	Bhiga .. (Also called Kadh, Kurga, Chatta, or Mahjal).	13—15′ ..	9—12′ ..	$1\frac{1}{4}$″—$1\frac{1}{2}$″ ..	..
II. Fixed nets	(*i*) Nilotu or Pand.	..	..	..	..
	(*ii*) Nara ..	100′ ..	6′ ..	..	..
II. Casting nets	(*i*) Sorru	Diameter=3—16′		(*i*) $\frac{1}{2}$″	Cotton ..
	(*ii*) Werru ..			(*ii*) $\frac{3}{4}$″	
	(*iii*) Dobajju ..			(*iii*) 1″	
	(*iv*) Palka ..			(*iv*) $1\frac{1}{4}$″	
	(*v*) Sotwano Pakha.			(*v*) $1\frac{1}{2}$″	
IV. Hand nets	(*i*) Kochbi (a bag net).	Diameter of bag=3′		1″ square or 4″ all round.	..
		Length of bag=3′		..	..
		Length of handle=3′		..	..

used in the Indus system of rivers.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	A stake net is fixed across the current at the tail of the pool. The drag net is worked down the pool by a group of men who shout, splash and do everything to drive the fish before them. The lower edge of the drag net is weighted. Sometimes 20 or more drag nets are laced together and shot from one bank of the river when the water level is low.	..	
..	..	Smaller than the drag net. Fixed in pools at night, the bottom resting on the bed of the pool and the upper edge on the surface.	..	
..	..	The bottom is not weighted. The net is kept floating with the help of hollow bamboo sticks or reeds attached to the upper end. The net is staked at one end of the pool and the fish are driven towards the net.	..	
..	..	The mouth is circular in form and weights are attached at the edge. The fisherman wades into the shallow water and casts the net with a rotatory motion 5—6′ from him. The casting nets used in the plains have the puckering strings while those of the hills are the "stringless" variety.	..	
..	..	This is a bag net with a bamboo handle attached. Used near falls for catching fish ascending during March to June and also during floods to take "spawners" and small fish which take shelter in pools near the banks.		

Type of fishing implement.	Vernacular name.	Dimensions.			Material.
		Length.	Breadth or depth.	Size of mesh.	
IV. Hand nets—*contd.*	(*ii*) Dhangla ..	..	..	1½″ square 6″ all round.	..
V. Dip nets ..	Kurli ..	..	..	..	..
VI. Fish traps	Chip ..	Space between the split bamboo= 1½″ square		..	Bamboo splints.
VII. Lines ..	(*i*) Lang or Dor (long line).	..	..	..	..
	(*ii*) Dori .. (hand line).	..	..	..	..
	(*iii*) Bansi, Birhi and Chheep. (rod and line)	..	..	..	..

Note.— There are various other methods surreptitiously used in the E. Punjab which have been

used in the Indus system of rivers—concld.

Cost.	Number of men or boats required.	Description and mode of operation.	Kinds of fish caught.	Remarks.
Rs.				
..	..	A combination of dip and drag nets. It is rectangular with sticks (3—4ft.) on the shorter sides and tight cords on the lower and upper sides. Two men, one on each side drag it in small streams or shallow waters.		
..	..	The Kurli is conical in shape and is made of 4 sticks tied together at the top. A circular piece of net is fastened to the free ends of the sticks at the broad end.	..	Used in shallow waters. "Kurl" in Punjabi means a "fish eagle".
..	..	Chip is a platform of split bamboos, interwoven so as to leave interstices of $1\frac{1}{2}$" square between the sticks. The platform is erected under a waterfall in such a way that it slopes upwards on the down-stream side. The fish coming down the stream fall on the platform. The water and the small fingerlings run through the interstices leaving the bigger fish on the platform. The chip is erected by a group of fishermen towards the end of the monsoon.	Carps which have spawned and are returning to the plains.	A licence has to be obtained for setting this trap.
..	..	The line is set in the usual manner across a river or *jheel*. As many hooks as can be tied at 6" intervals are attached to the line. Bait: earthworm, small fishes and the larvae of dragon flies.		
..	..	One or two hooks attached to a line with a heavy sinker. Hooks are baited and the line thrown into the water.	Ground feeders like cat-fishes.	
..	..	Rod and line fishing is becoming very popular in the E. Punjab. Several areas are reserved for rod and line fishing only.		

declared illegal.

GLOSSARY OF UP-TO-DATE SCIENTIFIC NAMES.

Day's nomenclature	*Up-to-date nomenclature.*
1. *Carcharias gangeticus*	1. *Carcharhinus gangeticus* (M. H.)
2. *Galeocardo rayneri*	2. *Galeocerdo arcticus* (Faber).
3. *Zygaena blochii*	3. *Sphyrna blochii* (C.)
4. *Rhynchobatus djeddensis*	4. *Rhynchobatus djiddensis* (Forsk).
5. *Trygon sephen*	5. *Dasyatis* (*Pastinachus*) *sephen* (Forsk).
6. *Arius dussumieri*	6. *Tachysurus dussumieri* (C. V.)
7. *Arius sona*	7. *Tachysurus sona* (Ham.)
8. *Wallago attu*	8. *Wallagonia attu* (Bl.)
9. *Bagarius yarrellii*	9. *Bagarius bagarius* (Ham.)
10. *Pangasius buchanani*	10. *Pangasius pangasius* (Ham.)
11. *Silundia gangetica*	11. *Silonia silondia* (Ham.)
12. *Pseudeutropius garua*	12. *Clupisoma garua* (Ham.)
13. *Clupea longiceps*	13. *Sardinella longiceps* (C. V.)
14. *Clupea fimbriata*	14. *Sardinella fimbriata* (C. V.)
15. *Clupea ilisha*	15. *Hilsa ilisha* (Ham.)
16. *Engraulis purava*	16. *Thrissocles purava* (Ham.)
17. *Engraulis telara*	17. *Setipinna phasa* (Ham).
18. *Cybium guttatum*	18. *Scomberomorus guttatus* (Schn.)
19. *Cybium commersonii*	19. *Scomberomorus commerson* (Lac.)
20. *Caranx crumenophthalmus*	20. *Selar crumenophthalmus* (Bl.)
21. *Equula splendens*	21. *Leiognathus splendens* (C).
22. *Stromateus cinereus*	22. *Pampus argenteus* (Euphr.)
23. *Stromateus sinensis*	23. *Chondroplites chinensis* (Euphr.)
24. *Stromateus niger*	24. *Parastromateus niger* (Bl.)
25. *Plagusia bilineata*	25. *Paraplagusia bilineata* (Bl.)
26. *Mugil corsula*	26. *Mugil* (*Liza*) *corsula* Ham.
27. *Mugil speigleri*	27. *Mugil* (*Mugil*) *speigleri* Blkr.
28. *Polynemus tetradactylus*	28. *Eleutheronema tetradactylus* (Shaw).
29. *Sciaena diacanthus*	29. *Johnius diacanthus* (Lac).
30. *Ophiocephalus striatus*	30. *Ophicephalus striatus* Bl.
31. *Anabas scandens*	31. *Anabas testudineus* (Bl.)
32. *Clarias magur*	32. *Clarias batrachus* (L.)
33. *Saccobranchus fossilis*	33. *Heteropneustes fossilis* (Bl.)
34. *Catla buchanani*	34. *Catla catla* (Ham.)
35. *Barbus tor*	35. *Barbus* (*Tor*) *putitora* (Ham.)

Barbus tor as described in this paper is a composite species.

Composed of—

(i) *Barbus* (*Tor*) *tor* (Ham.)
(ii) *Barbus* (*Tor*) *putitora* (Ham.) } Northern forms.

(iii) *Barbus* (*Tor*) *khudree* Sykes.
(iv) *Barbus* (*Tor*) *mussullah* Sykes. } Peninsular forms.

(v) *Barbus* (*Tor*) *mosal* (Ham.)
(vi) *Barbus* (*Tor*) *progenieus* Mc. Clell } Assam forms

BIBLIOGRAPHY.

(1) Chopra, B. .. "Some Food Prawns and Crabs of India and their Fisheries"—*Journ. Bom. Nat. Hist. Soc.*, Vol. XLI, 1939.

(2) Day, F. .. *Fishes of India* (London, 1878).

(3) —— .. "Fishes" in *Fauna of British India.* (London, 1889).

(4) Day, F. .. Report on the Fresh Water Fish and Fisheries of India and Burma, 1873.

(5) —— .. Report on the Sea Fish and Fisheries of India and Burma, 1873.

(6) De, K. C. .. Report on the Fisheries of Eastern Bengal and Assam, 1910.

(7) Gordon, W. J. .. *Our Country's Fishes.* (London).

(8) Gupta, K. G. .. Reports on the Results of Enquiry into the Fisheries of Bengal and into the Fishery matters in Europe and America. 1908.

(9) Hamid Khan .. *Journ. Bom. Nat. Hist. Soc.*, Vol. XXXIII 1932, p. 893.

(10) Hamilton, F. .. *An Account of the Fishes Found in the River Ganges and its Branches* (Edinburgh, 1822).

(11) Hefford, A. E. .. "Report on the Work of the Steam Trawler *William Carrick*" (Bombay, 1923).

(12) Hora, S. L. .. "The Game Fishes of India." (Parts I to X) *Journ. Bom. Nat. Hist. Soc.* Vols. XXXIX to XLI (1937-40).

(13) Hora, S. L. .. Wanderings of the Bombay duck, *Harpodon nehereus* (Ham) in Indian Waters. *Journ. Bom. Nat. Hist. Soc.* Vol. XXXVII, pp. 640—654 (1934).

(14) —— .. Siluroid Fishes of India, Burma and Ceylon. *Rec. Ind.* Mus. Vol. XXXVIII, pp. 199—209 (1936).

(15) Hornell, J. .. "A Statistical Analysis of the Fishing Industry of Tuiticorin" "(*Madras Fisheries Bulletin*, Vol. XI, 1917).

(16) —— .. "Fishing Methods of the Madras Province", Part I. (*Madras Fisheries Bulletin, Vol.* XVIII, 1925).

(17) —— .. ———————— Part II (*Madras Fisheries Bulletin.* Vol. XXVII, 1938).

(18) —— *Memoirs of the Asiatic Society of Bengal*, Vol. VIII, 1924.

(19) Moses, S. T. .. "A Statistical Account of the Fish Supply of Madras." (*Madras Fisheries Bulletin*, Vol. XV, 1923).

(20) Nicholson, F. A. "The Preservation and Curing of Fish", (*Madras Fisheries Bulletin No. 3*, Reprint, 1930).

(21) —— .. "Remarks on Canning", (*Madras Fisheries Bulletin*, Vol. XIII, 1921)

(22) Panniker, N. K. "Prawn Industry of the Malabar Coast"—*Journ. Bom. Nat. Hist. Soc.*, Vol. XLIX, 1937, p. 343.

(23) Rai, H. S. .. "The Shell-Fisheries of the Bombay Province", Parts I and II, *Journ. Bom. Nat. Hist. Soc.*, Vols. XXXV and XXXVI.

(24) Shaw, G. E. and Shebbeare, E. O. "The Fishes of Northern Bengal"—*Journal of the Royal Asiatic Society of Bengal, Science*, Vol. III, 1937.

(25) Sorley, S. T. .. "The Marine Fisheries of the Bombay Province", (Bombay, 1933).

(26) Spence, R. and Prater, S. H. .. "Game Fishes of Bombay, Etc." *Journal Bom. Nat. Hist. Soc.*, Vol. XXXV, 1932.

(27) Thomas, H. S. .. *Tank Angling in India.* (Calcutta, 1927).

(28) Yonge, C. M. .. "*Queer Fish*" (London, 1928).

BM2AMA—1,500—21-4-50—GIBPS

List of publications issued by the Agricultural Marketing Adviser to the Government of India—contd.

Symbol No.	Name of Publications.	Price.
*AMA. 32 .	Report on the Marketing of **Coconuts** and Coconut Products in India	Rs. 1-4-0 or 2*s*.
*AMA. 33 .	Report on the Marketing of **Lac** in India	Rs. 1-4-0 or 2*s*.
AMA. 34 .	Instructions regarding the Grading and Marketing of **Ghee** in connection with Agricultural Produce. (Grading and Marking) (Ghee) Rules, 1938	As. 4 or 5*d*.
*AMA. 35 .	Abridged edition (in English) of the Report on the Marketing of **Rice** in India and Burma	As. 8 or 9*d*.
*AMA. 36 .	Report on Co-operative Marketing of Agricultural Produce in India	Rs. 1-4-0 or 2*s*.
*AMA. 37 .	Report on the Marketing of **Skins** in India and Burma	Rs. 1-4-0 or 2*s*.
*AMA. 38 .	Abridged edition (in English) of the Report on the Marketing of **Tobacco** in India and Burma	As 8 or 9*d*.
*AMA. 39 .	Hand Book on the Quality of Indian Wool	As. 8 or 9*d*.
*AMA. 40 .	Report on Fairs, Markets and Produce Exchanges in India	Rs. 1-4-0 or 2*s*.
*AMA. 41 .	Report on the Marketing of **Hides** in India and Burma	Rs. 1-4-0 or 2*s*.
*AMA. 42 .	Report on the Marketing of **Citrus Fruits** in India	Rs. 1-4-0 or 2*s*.
*AMA. 43 .	Report on the Marketing of **Gram** in India	Rs. 1-4-0 or 2*s*.
*AMA. 44 .	Report on the Marketing of **Barley** in India	Rs. 1-4-0 or 2*s*.
*AMA. 45 .	Report on the Marketing of **Cashewnuts** in India	Rs. 1-4-0 or 2*s*.
*AMA. 46 .	Report on the Marketing of **Fish** in India	Rs. 1-4-0 or 2*s*.
*AMA. 47 .	Report on the Marketing of **Bananas** in India	Rs. 1-4-0 or 2*s*.
*AMA. 48 .	Report on the Marketing of **Sheep** and **Goats** in India	Rs. 1-4-0 or 2*s*.
AMA. 50 .	Report on the Marketing of **Ghee** and Other **Milk** Products in India	Rs. 3-0-0 or 5*s*.
*AMA. 51 .	Report on the Marketing of **Cattle** in India	Rs. 1-4-0 or 2*s*.
*AMA. 52 .	Report on the Marketing of **Wool** and **Hair** in India	Rs. 1-4-0 or 2*s*.
AMA. 53 .	Report on the Marketing of **Castor Seed** in India	Rs. 1-4-0 or 2*s*.
AMA. 54 .	Bulletin on the Marketing of some important Stone, Pome and small fruits and pine-apples in India	Rs. 1-4-0 or 2*s*.
AMA. 55 .	Supplement to the Report on the Marketing of **Wheat** in India	Rs. 1-4-0 or 2*s*.
AMA. 56 .	Report on the Production and Marketing of **Cardamom** in India	Rs. 1-4-0 or 2*s*.
[illegible] .	Agricultural Produce (Grading and Marking) Act, 1937 with Rules made prior to 31st December, 1946 (3rd Edition)	Rs. 1-8-0
[illegible] .	Report on the Marketing of Sann Hemp in India	Rs. 1-8-0
[illegible] .	Report on the Marketing of Arecanuts in India	Rs. 1-4-0
[illegible] .	Report on the Marketing of Milk in the Indian Union	Rs. 3-8-0
61.48 .	Annual Report of the Directorate of Marketing and Inspection for the year ending 31st December, 1948	Rs. 1-4-0 or 2*s*.
AMA. .	Report on the Marketing of Fish in the Indian Union (under print)	Rs. 1-4-0 or 2*s*.
	Abridged edition (in Hindi) of the Report on the Marketing of Milk in India.	Unprinted
	Brochure on the Marketing of Fish in India	Unpriced.
	Brochure on the Marketing of Wool in India	Unpriced.
	Brochure on the Marketing of Milk in the Indian Union	Unpriced.
	Brochure on the Marketing of Isubgol (Psyllium seed) in India	Rs. 1-8-0
AMA 63 .	Brochure on the Marketing of Kapok and Akund Floss in India.	Rs. 1-8-0
AMA 65 .	Brochure on the Marketing of Groundnuts in India.	Rs. 7-14-0
AMA 64 .	Atlas on Livestock and Livestock Products in India.	

NOTE.—*The report is out of stock with the Manager of Publications, Central Publication Branch, Delhi.

N. B.—Prices are inclusive of packing and postage in India. Indentors requiring the above are requested to quote only the symbol and not the title of the publications.

Publications noted above can be had from (a) Manager of Publications, Civil Lines, Delhi, (b) Book Depot 8, Hastings Street, Calcutta (for local cash sale only) and (c) Any of the authorised agents for the sale of Government of India publications.

In Europe and America, Public Department (Publication Branch), Office of the High Commissioner for India, India House, Aldwych, London, W.C. 2.